TOURNAMENT
CYBERBALL® 2072

VS. DUALSYSTEM™
Kit Installation Instructions

ATARI
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For technical assistance:

If reading through this manual does not lead to solving your game maintenance or repair problem, call TELE-HELP® at one of these Atari Games Customer Service offices:

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P.O. Box 361110
Milpitas, CA 95035
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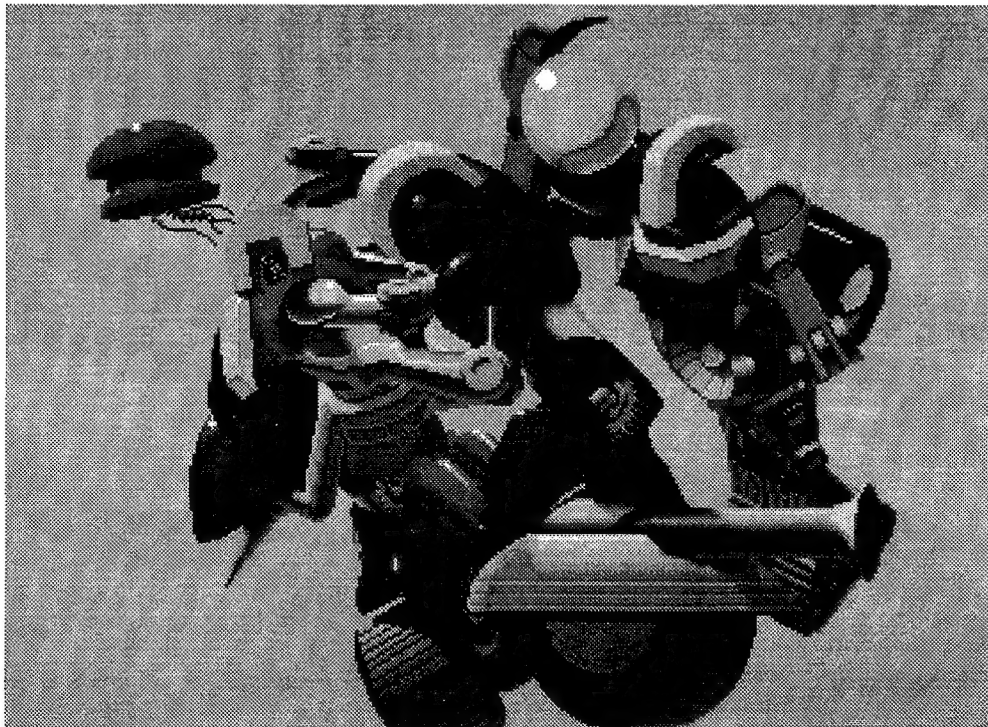Tipperary Town, Ireland
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TOURNAMENT
CYBERBALL®
2072

VS. DualSystem Upright Kit
Installation Instructions

(for use only with Nintendo VS. DualSystem upright cabinets)

VS. DualSystem is a registered trademark of Nintendo of America, Inc. This kit is designed and manufactured by Atari Games Corporation. It is not designed, manufactured, sponsored or endorsed by Nintendo.

Notice Regarding Non-Atari® Parts

WARNING

Use of non-Atari parts or modifications of any Atari game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

You may void the game warranty (printed on the inside back cover of this manual) if you do any of the following:

- Substitute non-Atari parts in the game.
- Modify or alter any circuits in the game by using kits or parts *not* supplied by Atari Games Corporation.

NOTE

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area or modification to this equipment is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. If you suspect interference from an Atari game at your location, check the following:

- All ground wires in the game are properly connected as shown in the game wiring diagram.
- The power cord is properly plugged into a grounded three-wire outlet.
- On games provided with an Electromagnetic Interference (EMI) ground cage, be sure that the game printed-circuit boards (PCBs) are properly installed on the EMI ground cage and that the end board is securely installed with **all** screws in place and tightened.

If you are still unable to solve the interference problem, please contact Customer Service at Atari Games Corporation. See the inside front cover of this manual for service in your area.

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Safety Summary

The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found in this manual whenever they apply.

WARNING

Properly Ground the Game. Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded three-wire outlet. If you have only a two-wire outlet, we recommend you hire a licensed electrician to install a three-wire grounded outlet. If the control panel is not properly grounded, players may receive an electrical shock! After servicing any part on the control panel, check that the grounding wire is firmly secured to the inside of the control panel. After you have checked this, lock up the game.

AC Power Connection. Before you plug in the game, be sure that the game's power supply can accept the AC line voltage in your location. The line voltage requirements are listed in the first chapter of this manual.

Disconnect Power During Repairs. To avoid electrical shock, disconnect the game from the AC power before removing or repairing any part of the game. If you remove or repair the video display, be very careful to avoid electrical shock. High voltages continue to exist even after power is disconnected in the display circuitry and the cathode-ray tube (CRT). Do not touch the internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing it. Do this after you disconnect it from the power source. First, attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Then momentarily touch the free end of the grounded jumper wire to the CRT anode by sliding the wire under the anode cap. Wait two minutes and do this again.

Use Only Atari Parts. To maintain the safety of your Atari game, use only Atari parts when you repair it. Using non-Atari parts or modifying the game circuitry may be dangerous, and could injure you and your players.

Handle the CRT With Care. If you drop the CRT and it breaks, it may implode! Shattered glass from the implosion can fly six feet or more.

Use the Proper Fuses. To avoid electrical shock, use replacement fuses which are specified in the parts list for this game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating. In addition, the fuse cover must be in place during game operation.

CAUTION

Properly Attach All Connectors. Make sure that the connectors on each printed circuit board (PCB) are properly plugged in. The connectors are keyed to fit only one way. If they do not slip on easily, do not force them. If you reverse a connector, it may damage your game and void your warranty.

Ensure the Proper AC Line Frequency. Video games manufactured for operation on 60 Hz line power (used in the United States) must not be operated in countries with 50 Hz line power (used in Europe). If a 60 Hz machine operates on 50 Hz line power, the fluorescent line ballast transformer will overheat and cause a potential fire hazard. Check the product identification label on your machine for the line frequency required.

ABOUT NOTES, CAUTIONS, AND WARNINGS

In Atari publications, notes, cautions and warnings have the following meaning:

NOTE — A highlighted piece of information.

CAUTION — Equipment and/or parts can be damaged or destroyed if instructions are not followed. You will void the warranty on Atari printed-circuit boards, parts thereon, and video displays if equipment or parts are damaged or destroyed due to failure of following instructions.

WARNING — Players and/or technicians can be killed or injured if instructions are not followed.
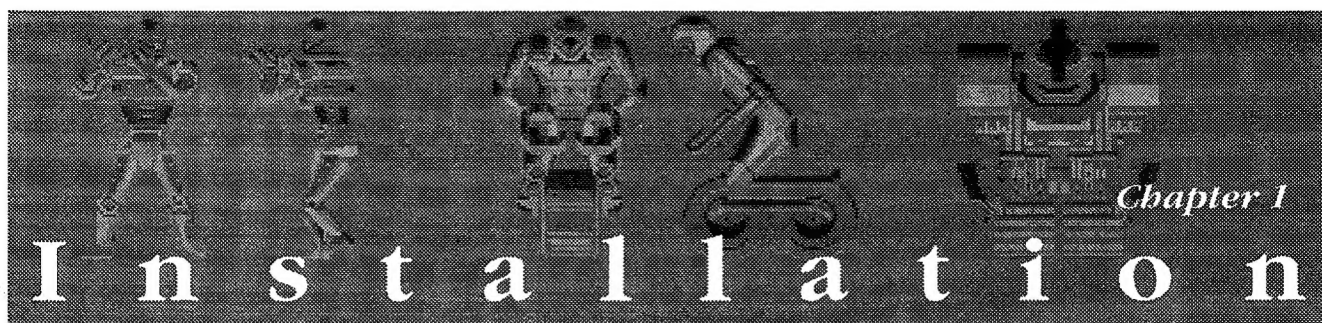
Installation

How to Use This Manual

This manual provides information for installing, testing, and troubleshooting the Tournament Cyberball® 2072 VS. DualSystem kit.

The manual is divided into the following chapters:

- Chapter 1 describes the installation procedure and the Tournament Cyberball 2072 game play.
- Chapter 2 contains self-test procedures.
- Chapter 3 contains maintenance procedures.
- Chapter 4 contains the kit parts list and PCB assembly drawings.
- Chapter 5 contains the schematics for the game PCB and audio PCB.

WARNING
To avoid electrical shock, unplug the video game cabinet during the conversion. After inspection, plug it only into a grounded 3-wire outlet.

Equipment Requirements

See Table 1-1 for the equipment required in the cabinet in which you are installing the Tournament Cyberball® 2072 kit.

CAUTION
Do not unplug or plug in the Tournament Cyberball 2072 game printed-circuit board (PCB) edge connector while the power is on. You could seriously damage the PCB.

Tools Required

- Two C-clamps
- Drill with 1/4 inch drill bit, a 1 3/16-inch hole cutter (or 1 3/16-inch chassis punch), and a 1 3/4-inch hole cutter

VS. DualSystem is a registered trademark of Nintendo of America, Inc.

Table 1-1 Equipment Requirements for the Tournament Cyberball 2072 Kit

Equipment	Specification
Video Display	■ Color RGB monitor ■ Separate positive horizontal and vertical sync or negative composite sync ■ Horizontal mounting ■ Horizontal frequency 15.750 KHz ■ Vertical frequency 60 Hz ■ Recommended size: 19 inch ■ Video input 1V to 3V peak-to-peak positive polarity
Control Panel	Metal only
Space Below Control Panel	At least 4 1/2 inches deep
Speaker	8 Ohms 10 Watts
Coin Mechanism	+5 VDC or +12 VDC
Power Cord	Three-conductor with ground
Power Supply	+5 VDC ± 0.25V @ 5.0 amps +12 VDC ± 0.5V @ 1.0 amp -5 VDC ± 0.5V @ 1.0 amps

- Phillips screwdriver
- Flat-blade screwdriver
- Socket set
- Wire cutters and strippers
- Straightedge
- Squeegee
- X-ACTO™ knife

Preparing the Existing Game for Conversion

1. Turn off power to the game.
2. Remove the ground strap from EMI cage.

NOTE

The "right" and "left" sides of the game are as if you were a player standing in front of the game.

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3. Using a Phillips-head screwdriver, remove the EMI card cage and discard the old screws. Opening the right coin door will allow easier access to some screws.

4. Remove the game harness.

5. Remove all the control panel decals, labels, and controls.

6. Remove any side decals from the cabinet. If your cabinet has wood grain or laminate sides, remove the old graphics and adhesive. If the sides are damaged, repair them before putting on the new decals.

7. Remove the video display tinted glass cover, display bezel, attraction shield, and marquee, if any.

8. Paint the cabinet, if required.

9. Wipe down and vacuum the cabinet as necessary.

Inspecting the Kit

Check to see that you have all the parts listed in the kit contents list in Table 1-2. If any part is missing or damaged, please contact your distributor with the Tournament Cyberball 2072 kit serial number, part number and description of the part, and date you received the kit.

Installing the Kit Parts

Product ID and FCC Label

Place the product ID label (part no. 038158-01) and FCC label (part no. 039450-01) on the back of the cabinet..

Installing the Game Board and PCB Cleat

NOTE

The following kit installation steps correspond to the numbers in Figure 1-1.

---

1. Insert the game board in the PCB cleat and position both on the cabinet floor snug against the side of the cabinet. Mark the place with a pen or chalk. Remove the game board and replace the PCB cleat on the cabinet floor, lining it up with the marks you made.

2. Using a Phillips-head screwdriver, screw the PCB cleat to the cabinet bottom with the two #8, 1-1/2" black screws.

3. Place the game board in the cleat and center the board on the cabinet wall.

4. Using two nylon washers behind the game board and two screws, attach the game board to the cabinet wall.

NOTE

Extra spacers are provided in case one or more fall behind the game board during installation. There is no need to try to remove the spacers if this happens, because they are non-conductive and will not harm the game's operation.

Installing the Power Supply Assembly

5. Position the power supply assembly on the cabinet floor. Using three screws, secure the power supply assembly to the cabinet floor.

Table 1-2 Kit Contents

Received?	Item
☐	Left Coinage Decals (two)
☐	Right Coinage Decals (two)
☐	Side Panel Decal (two)
☐	Left Attraction Film w/ Graphics
☐	Right Attraction Film w/ Graphics
☐	Logo Decal
☐	Left Control Panel Decal
☐	Right Control Panel Decal
☐	Control Panel Cover (two)
☐	PCB Guide Cleat
☐	Non-Resettable Coin Counter
☐	.187-Inch-Thick White Nylon Washers (eight)
☐	#10 x 3/4-Inch-Long, Cross-Recessed, Deep-Thread Screws (18)
☐	#8 x 1 1/4-Inch-Long, LPW, Deep-Thread, Cross-Recessed Screws (two)
☐	SAC PCB Assembly
☐	Tournament Cyberball 2072 Game PCB Assembly
☐	Component Plate Assembly
☐	Main Harness Assembly
☐	12 V Power Harness Assembly
☐	Video Harness Assembly
☐	Com/Aud Harness Assembly
☐	Tournament Cyberball 2072 VS. DualSystem Kit Installation Instructions
☐	Product Identification Label
☐	FCC Label

Note: All parts are a quantity of 1 each, except where noted in parentheses. Packaging materials are not included in this list.

6. With a fourth screw, attach the grounding strap from the EMI cage to the power supply assembly.

7. Plug the six-wire harness into the connectors on the game board.

8. Plug the three-wire harness into the existing power distribution box.

Installing the SAC (Sampled Audio Cruncher) Board

9. Grasp the SAC board with the heat sink in the lower left-hand corner. Align the front edge of the SAC board with the front edge of the game board. Screw the SAC board to the cabinet wall using four silver screws and four nylon washers between the board and the cabinet wall.

Installing the Coin Counter

10. Position the coin counter (CC1) on the existing right-hand coin box. Close the door to make sure the coin counter fits properly. Screw the coin counter to the coin box. You can install just one screw and bend the coin counter forward for easier viewing if you wish. Connect the wiring harness connector to the game board at the connector labeled *CC1*.

Installing the Wiring Harnesses

11. Plug the 12-volt power harness (part no. A047430-01) into the connector marked *AC/DC* on the SAC board. Three pins will remain unused.

12. Insert a screw into the screw-down loop and secure the loop to the upper left corner of the cabinet wall.

13. Connect the JS COM connector on the Com/Aud harness (part no. A047434-01) to the SAC board and the audio connector to the game board.

14. Locate the screw-down on the main harness (part no. A047425-01). It will be on the twisted pair of brown and white speaker wire. Screw the screw-down as close as possible to the top left corner above the SAC board.

15. Plug the coin connector into the SAC board.

16. Plug the AC/DC connector into the remaining three pins marked *AC/DC* on the SAC board.

17. Plug the speaker connector into the SAC board.

18. Plug each of the four player connectors into the game board.

19. Route the wiring harness across the side of the cabinet underneath the bottom edge of the SAC board and screw the harness down at the bottom right corner of the SAC board. Route the main harness up and around the top right side of the SAC board and secure the harness to the cabinet wall at the top right corner of the SAC board. Route the harness across the shelf, and plug in the coin door connectors.

20. Bring the twisted pairs of speaker wires on the main harness up to the monitor shelf, and secure the main harness wires under the tie-downs. Disconnect the speakers from the monitors. The game does not use the monitor sound. Connect the connector with the orange and white wires to the right speaker. Connect the connector with the brown and white wires to the left speaker.

21. Locate the video harness (part no. A047433-01). Connect the connector with the striped wires to the connector labeled *VIDEO 2* on the game board. Connect the connector with the solid-color wires to *VIDEO 1* on the game board. Route the video harness and secure it to the center tie-downs on the rear monitor shelf. Connect the connector with the solid-colored wires to the left monitor and the connector with the striped wires to the right monitor.

CAUTION
Your game will meet FCC regulations only if you do the following step.

---

22. Remove the ground straps from both monitor chassis by loosening the screws on the inside of the cabinet. Secure the loose ground straps so as not to cause shorts or damage.

Installing the Control Panels

23. Remove both panel assemblies from the cabinet by unlatching them from inside the cabinet cavity. Disconnect the control harnesses from the main harness.

24. Completely remove all items on the control panels, but leave the control harnesses intact.

25. Remove the decals from the panels. You may need to use a solvent such as rubber cement thinner or acetone to remove excess adhesive. Considerable effort is necessary to completely clean and smooth the panel surfaces.

26. Be sure the panels are free of all grease, dirt or adhesive prior to applying the new decals. Otherwise, the new decals will not adhere well. Remove the backing paper from each decal and apply one decal to each panel surface.

27. Remove the backing paper from one side of the control panel plex cover.

28. Place the uncovered surface over the decal.

29. Attach the two button assemblies through all parts in order to clamp the pieces together. Use the C-clamps to hold the edges.

30. Using a 5/16" drill bit, drill four holes in the metal control panel cover, using the holes in the plex cover as a guide. Remove any plastic or metal flakes under the cover.
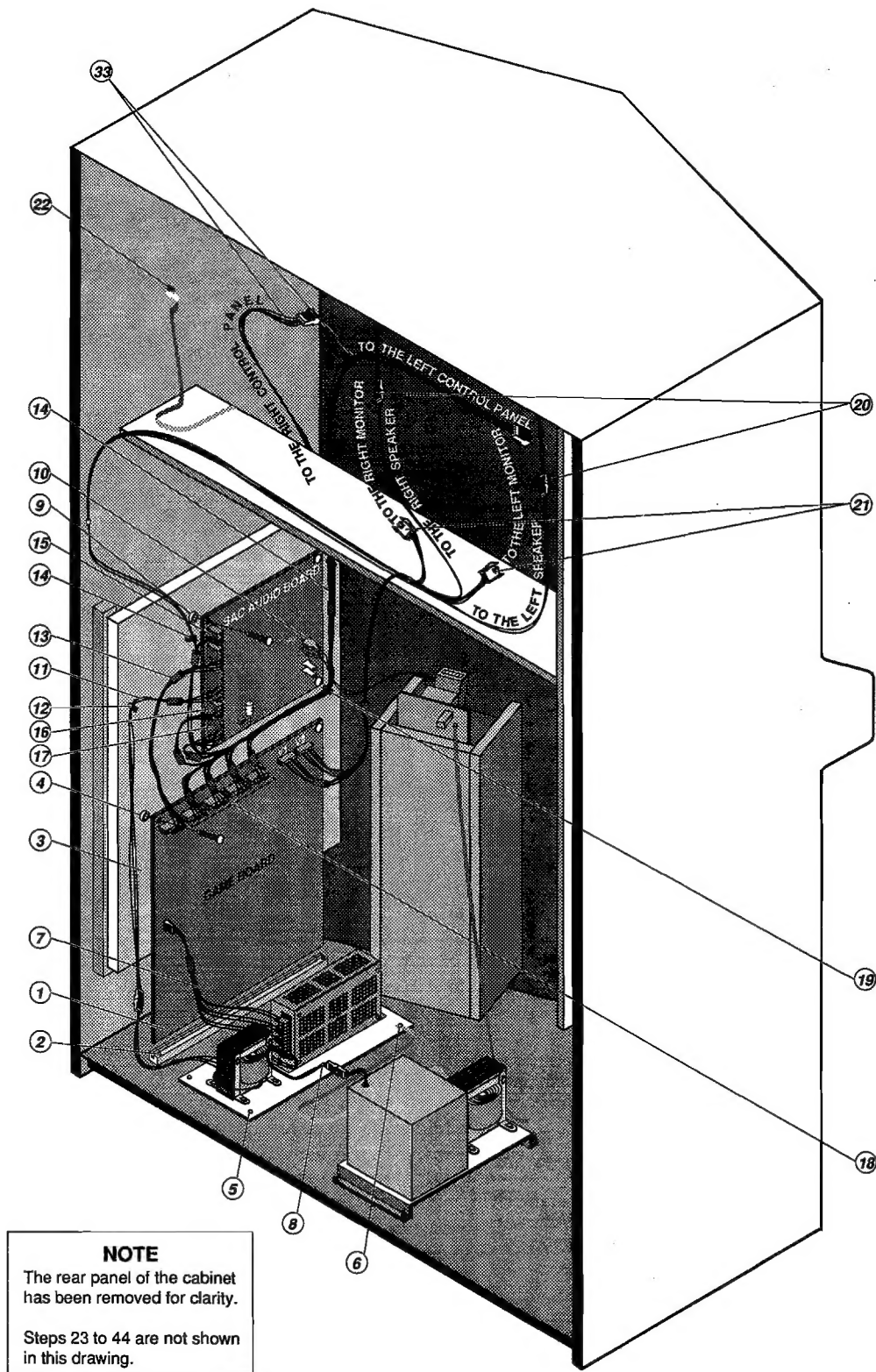
NOTE

The rear panel of the cabinet has been removed for clarity.

Steps 23 to 44 are not shown in this drawing.

Figure 1-1 Installing the Conversion Kit Parts

31. Connect the grey and black wires to the left player button and the green and black wires to the right player button.

32. Remove the paper from the top of the control panel plex cover.

    Use Loc-tite or an equivalent to secure the button assemblies. Attach the four carriage bolts and nut/washer assemblies through all parts. Do not over-torque the screws.

33. Connect the two control panel connectors to the main harness.

Replacing the Attraction Panel

34. Remove the four screws from the upper retainer at the very top of the cabinet.

35. Remove the glass.

36. Remove and discard the old attraction film.

37. Remove any decal strips from the glass. Clean as necessary.

38. Fit the new attraction panel into the cabinet. Trim to fit as necessary.

39. Replace the glass.

40. Replace the top-most retainer and screws.

Installing the Side and Front Decals

41. Position the round decals approximately 2-1/4" from the top and sides of the cabinet.

42. Remove the paper backing from the decals and apply the decals to the cabinet.

43. Place the logo decal in the nearly-triangular box between the two playing areas. Remove the paper backing and apply it.

44. Apply the coinage decals (two per side) to each front panel of the game, vertically centering the decals at the top lock of the coin door.

Testing After Power-Up

Use the self-test to check the operation of the game. Refer to Chapter 2 for information about the self-test.

We suggest that you perform the self-test when you first set up the game, each time you collect the money, and when you suspect game failure.

Setting the Coin and Game Options

The Tournament Cyberball coin and game options are set during the self-test. See Chapter 2 for information about the option settings.

Game Play

This section of the manual describes the theme of the Tournament Cyberball 2072 game and the game play features.

Introduction

Welcome to Tournament Cyberball 2072, celebrating 50 years of explosive entertainment! The new game includes: approximately 150 new plays (nearly 250 total), new selectable teams, unique robot players, a special challenge "Game Breakers" feature, a beat-the-coach feature, a player upgrade and team improvement (a real coin-grabber), and a selectable simplified game for beginner players.

New operator features include selectable team regions (West, Central, East, and International) and a tournament feature that cancels all special options.
See Chapter 2, Self-Test, for more information.

Tournament Cyberball has two monitors for two teams and up to four players. Each player uses an 8-way joystick and button to call the plays and control the action. Before field action starts, the player chooses the plays with the controls. During the play, the joystick controls the robot's direction on the field. On the offense, the button controls the quarterback's passes and laterals. On the defense, the button gives a defensive player Turbo Defense, a quick burst of speed.

Tournament Cyberball 2072 can be played by one to four players; the players compete against each other or the computer. One player can play against the computer, another player, or two other players. Two players can form a team and play against the computer, or other players.

A new simplified game mode has been added for beginner players. It eliminates the need for many decisions that require advanced skills, such as team selection, coach selection (vs. computer), team funds, and all player purchases and upgrades. At the same time, both offensive and defensive play selection decisions have been streamlined to allow more time for on-field action.

Play Mode

Tournament Cyberball 2072 rules are similar to football rules, but players must keep the ball from exploding. If the ball explodes, possession turns over. The ball status display shows whether the ball is cool, warm, hot, or critical. A critical ball will explode if it is not defused. The player can defuse the ball by moving it over the 50-yard line or goal line.

On the line of scrimmage, the robot that the player controls is a slightly different color from the others. Each player controls one robot on his team. By pressing a player button before the ball is hiked, the player can control a different robot.

New Players: For even more fun, two new players have been added to the game. The Power Back has the option

to pass or hand-off the ball again if so desired. This player will keep the defense on its toes! The other new player is the Outside Linebacker. With the ability for great pass coverage, look out for interceptions!

Beat-the-Coach: To simulate the excitement of playing against a live opponent, a beat-the-coach feature has been added. In advanced level games, players are asked which coach they want to compete against. Each coach has a win/loss record displayed. The record is updated as actual players win and lose against these coaches.

Game Breakers: An alternative to playing against a computer team is this new special challenge game. Players are presented with a list of situations to execute in order to win big bucks and advance to further levels. Like a "two-minute drill", this mode tests the skill of players under pressure situations.

A complete Tournament Cyberball 2072 game has six three-minute periods. Every player that buys into the game adds more time for everyone. The more people that play, more time everyone gets per period.

If a game ends in a tie, there's a sudden-death period to settle the score. The first team to score is declared the winner.

Auto-Challenge: If one or two are playing against the computer on one monitor and a new player starts a game on the other monitor, the first player(s) are automatically challenged by the newcomer. The original players can choose to accept or decline the challenge. With the Atari buy-in-anytime feature, new players and team can enter the action anytime during the game.

Player Choices: Players can select offensive and defensive plays, time-outs, and replace weak or demolished players.

The new Tournament Cyberball 2072 has approximately 250 offensive and defensive plays to choose from. The offensive player can choose a running play, option play, pass play, or a time-out. After the player selects the type of play, four patterns appear to choose from. The computer chooses these four patterns based on the current ball status and yards to the defuse line or the goal line.

Meanwhile, the defensive player can choose a short, medium, or long defense. The computer also presents four patterns for the player to choose from.

If a Tournament Cyberball 2072 robot is damaged during the action by tackles or exploding shrapnel, the player can replace it with a better robot bought with team "funds," which are awarded for good performance. Two stages of breakdown identify damage to a robot. A smok-

ing robot is the first warning that the robot is fatigued. A robot with smoke and fire means that a fumble will occur if tackled.

Special offers for player purchases and upgrades: In "advanced" skill level games, new features have been added to allow for multiple upgrades and purchases during the game. At halftime, players may spend any portion of their team funds to upgrade their players. Even multiple upgrades of any one player are possible. Also, if your team is trailing at the end of the first, second, fourth, and fifth periods, you will have the option to use game credits (or deposit a credit at that time) to purchase top-level offensive players or stronger defensive lineups. This makes it possible for the trailing team to have a chance to be more competitive.

High Score Tables: Three unique high-score tables appear in Tournament Cyberball 2072. In head-to-head games, the "Biggest Blow-Outs" table shows the most lopsided victories. For games versus the computer, the top scores are posted versus each of the four coaches. For "Game Breakers," a table records the top money winners in this special challenge format.

End-of-Game Stats: Upon completing a game, a game "Stat Summary" is shown. It posts the statistical performance commonly evaluated in today's football, such as total yards, passing yards, running yards, completion percentage and interceptions.
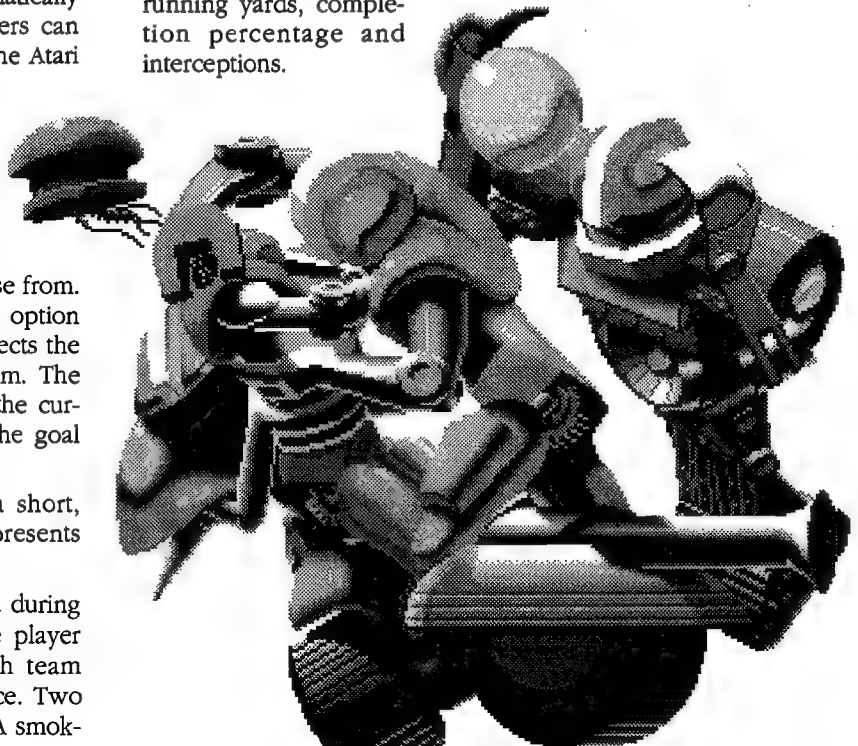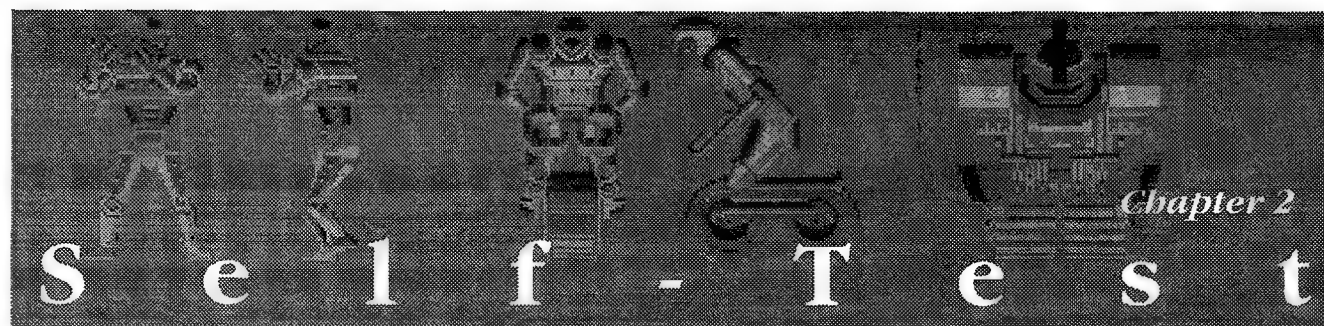
Self-Test

The Tournament Cyberball® 2072 game tests itself and provides visual and audible indications of the condition of the game circuitry and controls. Self-test information is displayed on the screen and through the sound system. No additional equipment is required.

We suggest that you perform a self-test when you first set up the game, each time you collect the money, or when you suspect game failure.

The self-test screens provide information about the game circuits and controls. To go into self-test, turn on the self-test switch located on the SAC audio board in the game drawer. If you turn on the self-test switch, and then turn on the game power, the game performs the RAM, ROM, and communications tests and then the switch test screen appears. If you turn on the self-test switch after the game power has been turned on, the self-test begins with the switch test.

To leave the self-test, turn off the self-test switch, and then exit the screen by pressing any right player button. To exit the switch test screen, press any left and any right player button together.

RAM, ROM, and Communications Tests

In addition to the usual RAM and ROM tests, a communications test has been added for Tournament Cyberball 2072's dual microprocessors, P1 and P2. If the game has an error in RAM, program ROM, or commu-

nications, you will see information about the error displayed on the screen as shown in Figure 2-1 and 2-2.

If the test finds no RAM or communications errors, then after a 30-second delay, the self-test goes to the ROM test without displaying a message. If the game has no ROM errors, then you will not see a message either.

If you have an error in any of these tests and you see a message, you can move to the next test by pressing the right player button.

If you have a RAM or communications error, refer to Table 2-1 for the location of the problem. If you have a ROM error, see Table 2-2 for information about the location of the error. If you think you have a ROM error, but the screen shows no message, look at Table 3-2 for information about the locations of various ROM functions.

Table 2-1 RAM Error Locations

Error Message[1]	Display Background	Location
P2[2]—Working RAM Bad	Red	4E, 4F
Video—Left RAM Bad	Green	9K, 11K
Video—Right RAM Bad	Green	8K, 10K
Color RAM—Left Bad	Black	21M, 22M
Color RAM—Right Bad	Black	25M, 26M
P2[2]—Common RAM Bad	Blue	4E, 4F
P2[2]—Detects Communications Error[3]	Purple	
P1[2]—Working RAM Bad	Red	4E, 4F
P1[2]—Common RAM Bad	Blue	4E, 4F
P1[2]—Detects Communications Error[3]	Purple	

[1] *If two errors are detected, for instance, P2 finds the common RAM bad and P1 finds a communications error, then the screen may be split or may have only one color. However, both messages will appear, no matter what the display background is.*

[2] *P1 and P2 and the dual microprocessors.*

[3] *"Detects Communications Error" applies to communications problems other than the common RAM being bad.*

Figure 2-1 RAM or Communications Error Message

VIDEO—LEFT RAM BAD
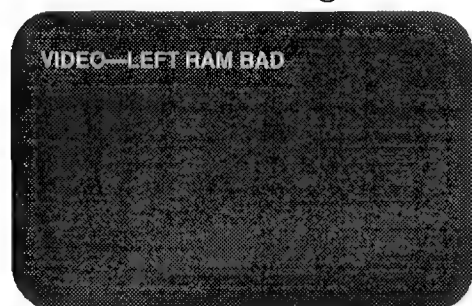
Table 2-2 ROM Error Locations

Micro-processor	Error Address	Location on Game PCB	
P1	000000	U=1M	L=1K/L
P1	020000	U=3M	L=3K/L
P2	000000	U=3C/D	L=1B
P2	020000	U=1C/D	L=3B

*The error is identified as an upper or lower error (U or L) on the screen, after the word error.
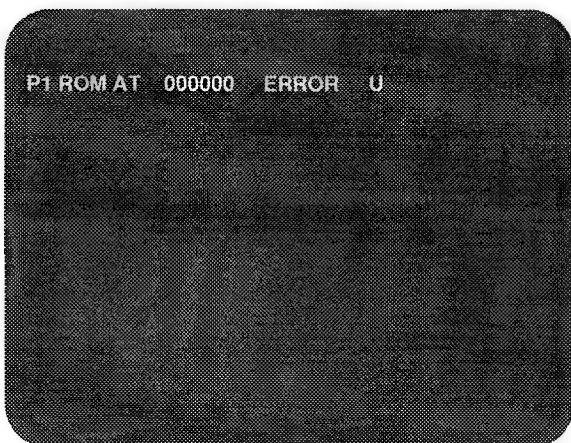
Figure 2-2 ROM Error Message

Switch Test

The switch test is shown in Figure 2-3. Use this test to check the controls. As you press the buttons and move the joysticks, the zeros on the screen should change to ones. If they do not, follow the maintenance and repair procedures for the controls in Chapter 3 of this manual. Press any right and any left player button together to move to the next screen.
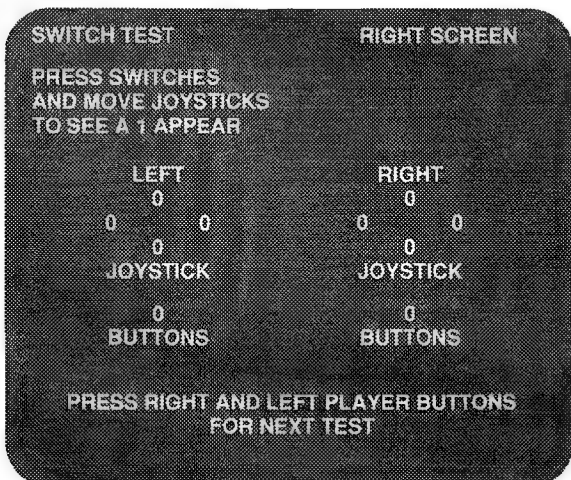

Figure 2-3 Switch Test Screen

Coin Options

Check and select the coin options on this screen. The screen is shown in Figure 2-4.

To move through the coin options, push the left joystick up or down. You can change the coin option shown in green. The factory default settings are shown in blue. To change an option setting, move the left joystick right or left.

If you change an option, but then want to change it back to the previous setting, press either left player button. To save the new settings and exit from the

screen, press either right player button.

If you want to exit the self-test, turn off the self-test switch, and press any right player button to exit the screen. All your changes are saved and you return to the attract mode.

The coin options are explained below. The settings, with defaults, are shown in Table 2-3.

- *Game Price* is the number of coins required for one credit.

- *Multiplier* is the number of coins each coin counts as in the coin mechanisms. For example, if you select 2, then each coin counts as two coins.

- *Bonus Adder* lets you choose bonus coins, no bonus, or free play.
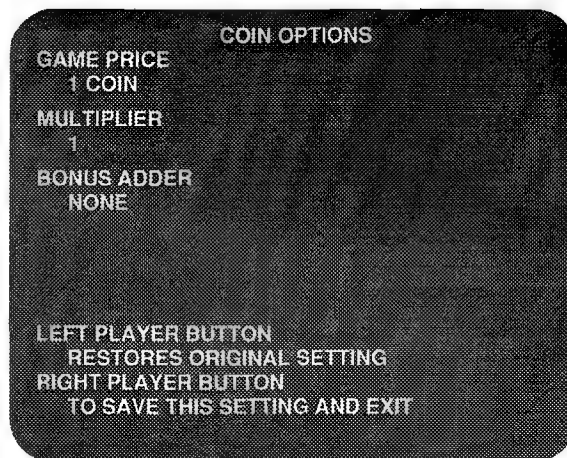
Figure 2-4 Coin Options Screen

Table 2-3 Coin Option Settings

Option	Settings						
Game Price	One coin ✦						
	Two coins						
	Three coins						
	Four coins						
Multiplier	1 ✦	2	3	4	5	6	7 8
Bonus Adder	None ✦						
	2 coins give 1 extra coin						
	4 coins give 1 extra coin						
	4 coins give 2 extra coins						
	5 coins give 1 extra coin						
	3 coins give 1 extra coin						
	Free Play (for demonstration mode)						

✦ *Manufacturer's recommended settings*

Game Options

Check and select the game options on this screen. The screen is shown in Figure 2-5.

To move through the game options, push the left joystick up or down. You can change the coin option shown in green. The factory default settings are shown in blue. To change an option setting, move the left joystick right or left.

If you change an option setting, but then want to change it back to the previous setting, press either left player button. To save the new settings and exit from the screen, press any right player button.

Figure 2-5 Game Options Screen

If you want to exit the self-test, turn off the self-test switch, and press any right player button to exit the screen. All your changes are saved and you return to the attract mode.

NOTE

Not all of the options are shown when you enter this screen. The word More *shows at the bottom of the screen to indicate more options. Use the left joystick to scroll through the options.*

The game options are explained below. The settings, with defaults, are shown in Table 2-4.
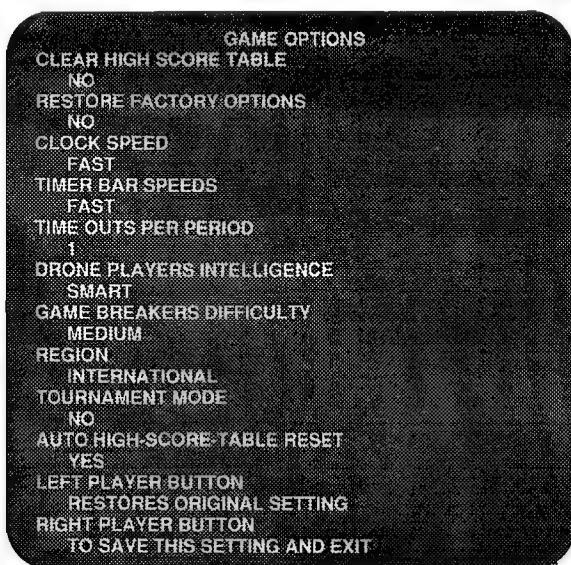
- *Clear High Score Table* clears the high score table, if it is set to yes.

- *Restore Factory Options* allows you to set all the game options to the factory options by choosing yes. If you want to use your own settings, be sure to set this to no.

Table 2-4 Game Option Settings

Option	Settings	
Clear High Score Table	No ◆	Yes
Restore Factory Options	Yes	No ◆
Clock Speed	Very slow	Slow
	Fast ◆	Very Fast
Timer Bar Speeds	Very Slow	Slow
	Fast ◆	Very Fast
Time-Outs Per Period	1 ◆	2
Drone Players' Intelligence	Average	Smart ◆
	Very Smart	
Game Breakers Difficulty	Easy	Medium ◆
	Hard	
Region	International ◆	West
	Central	East
Tournament Mode	No ◆	Yes
Auto High-Score-Table Reset	No	Yes ◆

◆ *Manufacturer's recommended settings*

- *Clock Speed* sets the amount of time the players receive per play period.

- *Timer Bar Speeds* controls the amount of time given on the timer bar shown on the play selection screen.

- *Time-Outs Per Period* is the number of time-outs a player is permitted per play period.

- *Drone Players' Intelligence* controls the responsiveness of the defensive players on the field. You can choose average, smart, or very smart. The higher the intelligence level, the faster the defense reacts. This setting does not affect the length of play time.

- *Game Breakers Difficulty* adjusts the "ante" levels in each game breakers page.

- *Region* selects the region of teams (see Table 2-5).

- Tournament allows you to turn on or off special game offers for tournament play.

Table 2-5 Regions

ICBL WEST	ICBL EAST
San Francisco Crush	Washington Crush
Phoenix Flash	Philadelphia Flash
Seattle Thunder	New York Thunder
San Diego Machine	Miami Machine
Honolulu Invasion	New England Invasion
Los Angeles Lightning	Atlanta Lightning
ICBL CENTRAL	**ICBL INTERNATIONAL**
Kansas City Crush	California Crush
Denver Flash	Tokyo Flash
Chicago Thunder	New York Thunder
Dallas Machine	Moscow Machine
Pittsburgh Invasion	Berlin Invasion
New Orleans Lightning	London Lightning

■ *Auto High-Score-Table Reset* automatically clears the high score table if 2,000 games have been played, and if at least 200 games have been played since the last player entered the high score table.

Statistics Screens

Use the information shown on the two statistics screens and on the histogram screen to keep track of your game use. Record the information on the Tournament Cyberball 2072 statistics page in the back of this manual.

The information shown on the two statistics screens (shown in Figures 2-6 and 2-7) is accumulated from the last time the statistics were reset.

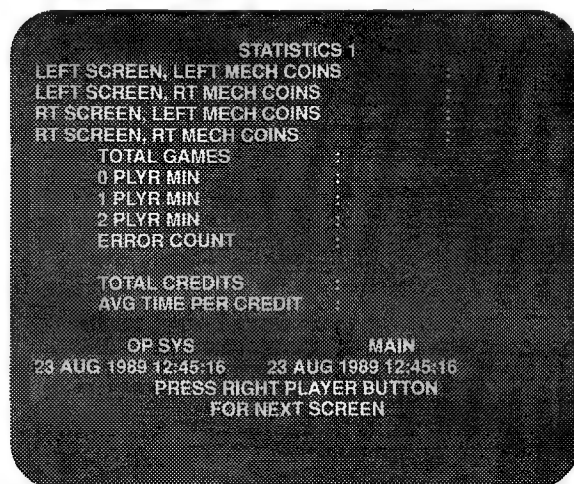At the bottom of the first statistics screen are several

Figure 2-6 First Statistics Screen

times and dates. These are the program version dates. If you are having problems with your game, you may need to give Atari Games Customer Service this information.

You can reset the statistics when you are on the second statistics screen by moving the left joystick and pressing any left player button.

First Statistics Screen

The first statistics screen shows the following:

■ *Left/Right Screen, Left/Right Mech Coins* show the number of coins in each of the game's four coin mechanisms.

■ *Total Games* shows the number of unique games played. A unique game is counted from the first player starting to the last player quitting, regardless of how many times the game was continued, or how many people played.

■ *0 Plyr Min* is the number of minutes the game was idle.

■ *1/2/3/4 Plyr Min* are the number of minutes the game was played by one, two, three, or four players, respectively.

■ *Error Count* shows the number of errors counted in the erasable memory. If you have a count of more than 75, you should have your game serviced by a qualified service technician.

■ *Total Credits* is calculated by multiplying the coins by the credit setting you chose in *Game Price*.

■ *Avg Time Per Credit* is the average amount of time in seconds that each credit gave.

Second Statistics Screen

The second statistics screen shows the following statistics both as the amount and as a percentage of the total games played.

■ *Comp Coach Games* is the number of games played in the beat-the-coach format.

■ *Human-Human Games* is the number of games played in the player vs. player mode.

■ *Game Breakers* is the number of games played under the game breaker format.

■ *1 Period Games* is the number of games in which the player(s) played for only one period of the complete six-period Tournament Cyberball 2072 game.

■ *2/3/4/5/6 Period Games* show the number of games in which the player(s) played for two to six periods.

■ *7-Plus Period Games* shows the number of games in which the player(s) played for seven or more periods. This means that the player(s) completed at least one Tournament Cyberball 2072 game and started another.
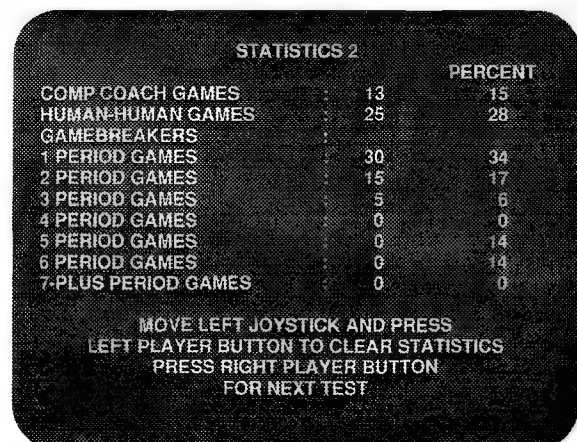

Figure 2-7 Second Statistics Screen

Histogram Screen

The histogram (horizontal bar chart) screen shows the length of game play and the number of games played. Write these numbers on the Tournament Cyberball 2072 statistics sheet in the back of this manual to help you maximize your profit.

Playfield Scrolling Test

You can test the playfield scrolling circuitry in this screen. Use the left joystick to move left, right, up, and down. The screen is shown in Figure 2-8.

Exit the screen by pressing any right player button.

Figure 2-8 Playfield Scrolling Test

Motion Object Test

The motion object (moving object) test screen is shown in Figure 2-9. This tests the movement and color of various game objects.

Choose a stack with the left player button. Use the left joystick to move the stack. Press the left player button
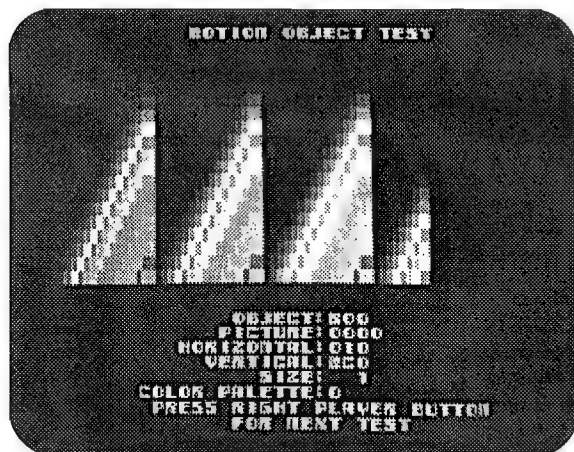
Figure 2-9 Motion Object Test

to move to the next stack. Exit the screen by pressing any right player button.

Alphanumerics Test

The alphanumerics test checks the condition of the alphanumerics in the game. The screen is shown in Figure 2-10.
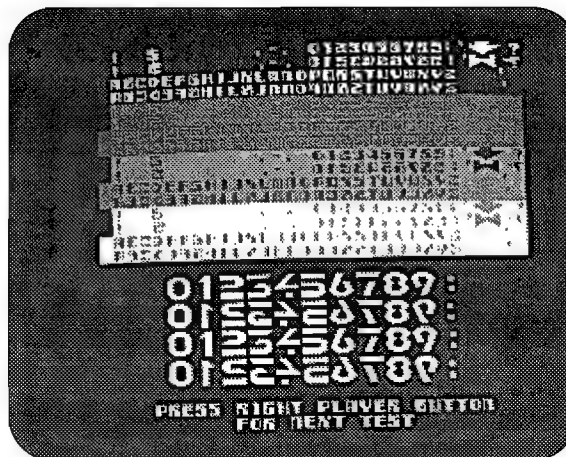
Figure 2-10 Alphanumerics Test

If you see an error on the screen, check the EPROMS at 15N and 16N. Press any right player button to go to the next test.

Color Test

This test indicates the condition of the video display color circuits. The screen is shown in Figure 2-11.

The left side of the screen should be black and change to grey in the middle. To the right of the grey the screen should appear red, green, blue, and white from top to bottom.

If the screen does not fit this description, see the video

Figure 2-11 Color Test

display manual included with the game for adjustments.

Exit the screen by pressing any right player button.

Color Purity Test

The color purity test has five screens. The first screen is shown in Figure 2-12.

Figure 2-12 Color Purity Test

These screens show the condition of the color purity circuit in the video display. Each screen should display a rectangle of color, with no curving at the corners and no lines in the display. The screens are red, green, blue, white, and gray.

If the screens are not correct, see the video display manual included with the game for adjustments.
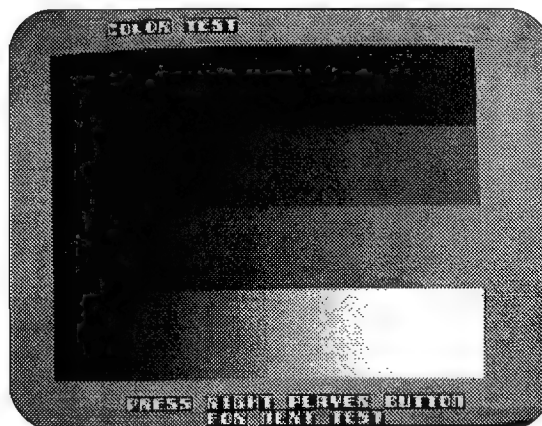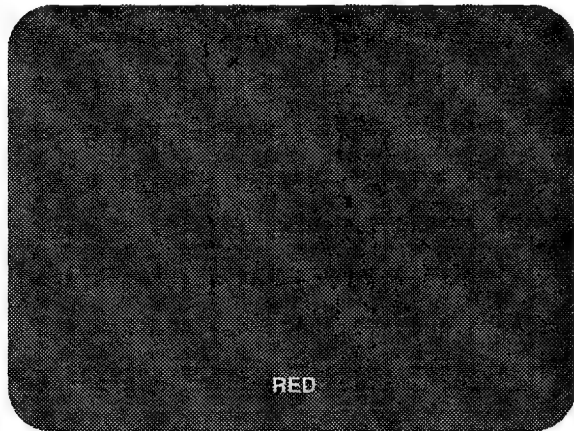
Exit each screen by pressing any right player button.

Convergence Test

The convergence test is shown in Figure 2-13. This test has three screens. The first is white, the second is purple, and the last is green.
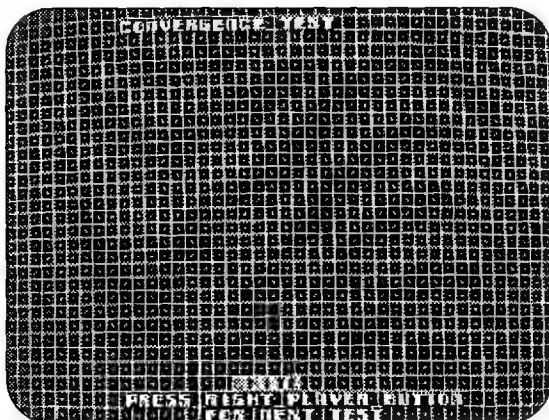
Figure 2-13 Convergence Test

Check the following on the screens:

■ The grid lines should be straight within 3.0 mm and the lines should not pincushion or barrel.

■ The convergence of the lines on the violet and white screens should be within 2.0 mm.

If these screens do not meet these criteria, see the video display manual for suggested adjustments.

Exit the screen by pressing any right player button.

Sound Test

The sound test indicates the condition of the music and sound effects circuits on the SAC PCB. (This board replaces the Stand-Alone Audio Board used in previous games.) The sound test screen is shown in Figure 2-14. The sound microprocessor resets at the beginning of the test. You will hear the first sound three seconds after the test starts.
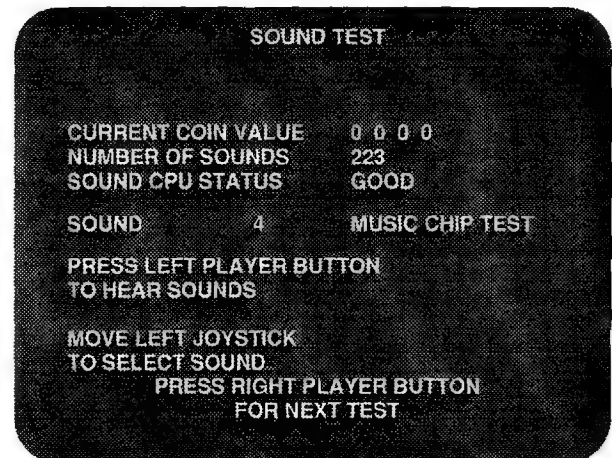
Figure 2-14 Sound Test

After the microprocessor is reset and you hear the first sound, the number of game sounds and the sound CPU status information appear. If the CPU is good, the word *Good* appears. If you get an error message at any point in the sound test, see Table 2-6 for more information.

The test cycles through the following tests:
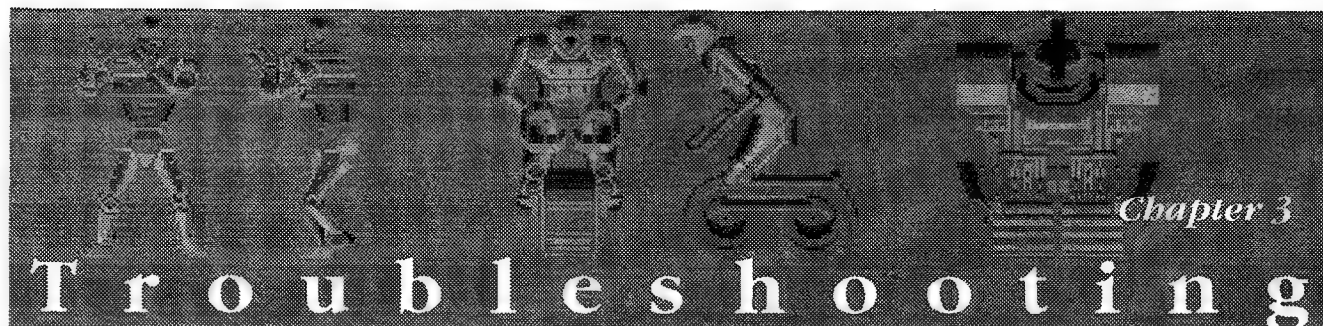
■ Music Chip Test
■ Sampled Audio Test
■ SCOM Reset Test

Use the left joystick and the left player buttons to select sounds and listen to them.

To leave the self-test, switch off the self-test switch, and then press any right player button to return to the attract mode.

Table 2-6 Faulty Sound RAM and ROM Locations

Error Message	Location on Audio PCB	Cause or Comment
Music Chip Time Out	4H	
Sound CPU Interrupt Error	2D, 1E, 6K	
Sound CPU RAM 1 Error	2H	
Sound CPU ROM 1 Error	2F	If this message appears when you enter the sound test, the sound processor cannot proceed any further. Press the left jump button to exit the test.
Communications Error #1	1D	Counts the number of errors caused by the audio or game PCB. This means that the SCOM chip (part no. 137526-001) on one of these boards is bad.
		CAUTION
		The SCOM chip is a CMOS IC and is static-sensitive. If you do not handle it properly, you can permanently damage it. See the section Static-Sensitive Devices, in Chapter 3, for more information.
Communications Error #2		Probably the audio PCB is disconnected from the game PCB, or the chip at 1D is not inserted into its socket.
Sound Processor Not Responding		A major problem with the audio PCB. If you cannot enter the self-test, the harness may be disconnected between the audio PCB and the game PCB.

Troubleshooting

This chapter contains troubleshooting tables for your Tournament Cyberball® 2072 VS. conversion kit.

One table has general troubleshooting information, the second contains the voltage levels and test points on the PCBs, and the last is a table of ROM-caused problems with specific ROMs to check and replace.

The tables in this chapter can help you troubleshoot problems in your game. The troubleshooting table lists possible sources of problems of various parts of the game The voltage inputs and test points can help you troubleshoot PCB problems. The ROM problems table can help determine exactly which ROM might be causing game play problems.

Table 3-1 Troubleshooting Table

| Problem	Suggested Action
Coin Mechanism Problems	Test the coin mechanisms with the sound test screen in the self-test.
Game Play Problems	1. Check the harness and connectors. 2. Perform the self-test. 3. Check the voltage levels on the PCBs. See Table 3-3, *Voltage Inputs and Test Points*. 4. Check *What ROM Problems Look Like*, Table 3-4, for specific ROM problems.
A screen character does not move or moves intermittently.	Check the connections.
Joystick Problems	1. Has the joystick been lubricated with white lithium grease? If not, lubricate. 2. Check the harness and connectors. 3. If you took the joystick apart, have you reassembled it correctly? 4. Make sure all the parts on the joystick are in good repair. Repair or replace parts.
The handle does not immediately return to center.	1. Make sure the actuator is installed correctly. 2. Lubricate the joystick.
A joystick handle sticks	1. Check if the screws holding the joystick assembly together are too tight. 2. Lubricate the assembly.
Sound Problems	1. Is the speaker volume turned up? 2. Check the audio ROM and RAM in the self test on the Sound Test screen. See Table 2-4, *Bad Sound RAM and ROM Locations*. 3. Check the voltage level to the audio PCB. See Table 3-3, *Voltage Inputs and Test Points*. 4. Check the wiring from the audio PCB to the speaker. 5. Replace the speaker.

Video Display Problems
Screen is Dark
	1. Is the game plugged in?
	2. Is the game turned on?
	3. Are the connections good?
	4. Check all of the items below. If you can answer *no* to any question, you have a problem with the video display. See your video display service manual.
	  a. Do you have power to the video display?
	  b. Are the video display's filaments lit?
	  c. Do you have high voltage to the video display?
	5. Is the voltage level to the video display PCB correct? (Power voltage is 100 VAC or 110 VAC, depending on the type of video display. Video signal voltage is 0.5 to 3.5 Volts.)
	6. If the level is not correct, check the connectors and the harness.
	7. Check the +12 V and the +10 V circuit on game PCB.

Display area wavers or is too small	1. Check the voltage to the video display PCB. 2. Do you have high voltage to the video display?
Convergence, purity or color problems	Use the screens in the self-test to adjust the video display.
Game is stuck in self-test	Make sure both self-test switches are switched off. If one or both are switched on, then the game will be in self-test.

Table 3-2 Voltage Inputs and Test Points on the PCBs

PCB	Voltage	Test Point or LED	Source and Purpose
Game	+5 ± 0.25 VDC	VCC1	Logic power from the switching power supply.
Game		CR1 LED	Lights when 5 V is applied to the main PCB and the reset (RST) jumper is open.
Audio		CR6 LED	Lights when the +14 V supply is good.
Audio		CR7 LED	Lights when the -14 V supply is good.
Audio		CR1 LED	Lights when the +5 V supply is good.

Table 3-3 What ROM Problems Look Like

Problem	Type of ROM	Location
Score box disappears Letters and numbers disappear. Play diagrams disappear. Vertical lines appear over the entire screen.	Alphanumeric	15N or 16N
Totally black screen	Both Alphanumeric ROMs. **NOTE:** Check video display before replacing ROMs	15N and 16N
Playfield has several rows of short vertical lines across it. Play diagrams and high score tables also have several rows of short vertical lines across them.	Playfield	8L/M, 9L M, 10L/M, or 11L/M
Linebacker, running back, or quarterback is breaking up.	Motion Object	11A, 11C, 15/16A, or 15/16C
Quarterback or cornerback is breaking up.	Motion Object	12A, 12C, 16/17A, or 16/17C
Powerback or outside linebacker is breaking up.	Motion Object	13A, 13C, 18A, or 18C
Sidelines, ball, receiver marks, or tight end is breaking up.	Motion Object	12A, 12C, 18A, or 18C

N O T E S

Illustrated parts lists
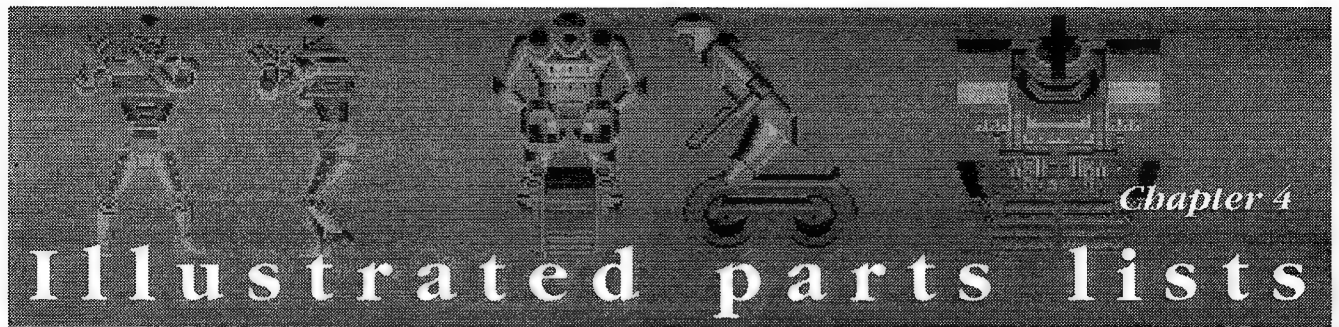
This chapter provides information you need to order parts for your game. Common hardware parts, such as screws, nuts, and washers are usually not listed in the parts lists.

The parts lists (except for the PCB parts lists) are arranged alphanumerically by Atari part number. All A-prefix numbers, which are assemblies, come first. Next are part numbers with six numbers followed by a hyphen (000598- through 201000-). Ending the list are part numbers with a two-number designation followed by a hyphen (00- through 99-).

The PCB parts lists are arranged in alphabetical order by component. Within each component list the parts are arranged numerically by part number.

When you order parts, give the part number, part name, the number of this manual, and the serial number of your game. With this information, we can fill your order rapidly and correctly. We hope this will create less downtime and more profit from your games.

Atari Games Customer Service phone numbers are listed on the inside front cover of this manual.

Items Not Shown:
047420-02
Right Control Panel Decal
TM-341
Tournament Cyberball 2072
VS. DualSystem Kit
Installation Instructions
046184-02
Right Coinage Decal (two)
047419-01
Logo Decal

047418-02
Right Attraction Film
w/ Graphics

047418-01
Left Attraction Film
w/ Graphics

A044963-22
SAC PCB Assembly
(see Figure 4-3)

047171-01
Side Panel Decal
(2 places)

175008-002
White Nylon
Washer

047420-01
Left Control
Panel Decal

047431-01
Control Panel
Cover

A047434-01
Com/Aud
Harness Assy

A047430-01
12 V Power Harness
Assyembly

171078-002
Coin Counter

176015-112
#10 x 3/4",
Cross-Recessed,
Deep-Thread Screw

A047433-01
Video Harness
Assembly

A047147-01
Tournament Cyberball 2072
Game PCB Assembly
(see Figure 4-2)

046184-01
Left Coinage Decal
(2 places)

047432-01
PCB Guide Cleat
176020-212
#8 x 1 1/4", LPW,
Deep-Thread,
Cross-Recessed Screw

A047425-01
Main Harness
Assembly

A047417-01
Component Plate
Assembly
(consists of six items—
see parts list)

NOTE
The rear panel of the cabinet
has been removed for clarity.

Figure 4-1 Tournament Cyberball 2072 VS. Kit Assembly
A047415-01 B

Figure 4-1 Tournament Cyberball 2072 VS. Kit Assembly
Parts List

Part No.	Description	Part No.	Description
046184-01	Left Coinage Decal (two)	A044963-22	SAC PCB Assembly (see Figure 4-3)
046184-02	Right Coinage Decal (two)	A047147-01	Tournament Cyberball 2072 Game PCB
047171-01	Side Panel Decal (two)		Assembly (see Figure 4-2)
047418-01	Left Attraction Film w/ Graphics		
		A047417-01	Component Plate Assembly, consisting of
047418-02	Right Attraction Film w/ Graphics		the following six items:
047419-01	Logo Decal	047416-01	Component Mounting Plate
047420-01	Left Control Panel Decal	149006-001	5 V, 13 A Switching Power Supply
047420-02	Right Control Panel Decal	A047429-01	Transformer Termination Assembly
		75-99518	#8-32 Nut/Washer Assembly
047431-01	Control Panel Cover (two)	A047427-01	5 V Power Harness Assembly
047432-01	PCB Guide Cleat	A047428-01	AC Power Harness Assembly
171078-002	Non-Resettable, 12 VDC Terminated		
	Counter	A047425-01	Main Harness Assembly
175008-002	.187-Inch-Thick White Nylon Washer	A047430-01	12 V Power Harness Assembly
		A047433-01	Video Harness Assembly
176015-112	#10 x 3/4-Inch-Long, Cross-Recessed,	A047434-01	Com/Aud Harness Assembly
	Deep-Thread Screw	TM-341	Tournament Cyberball 2072 VS.
176020-212	#8 x 1 1/4-Inch-Long, LPW, Deep-Thread,		DualSystem Kit Installation Instructions
	Cross-Recessed Screw		
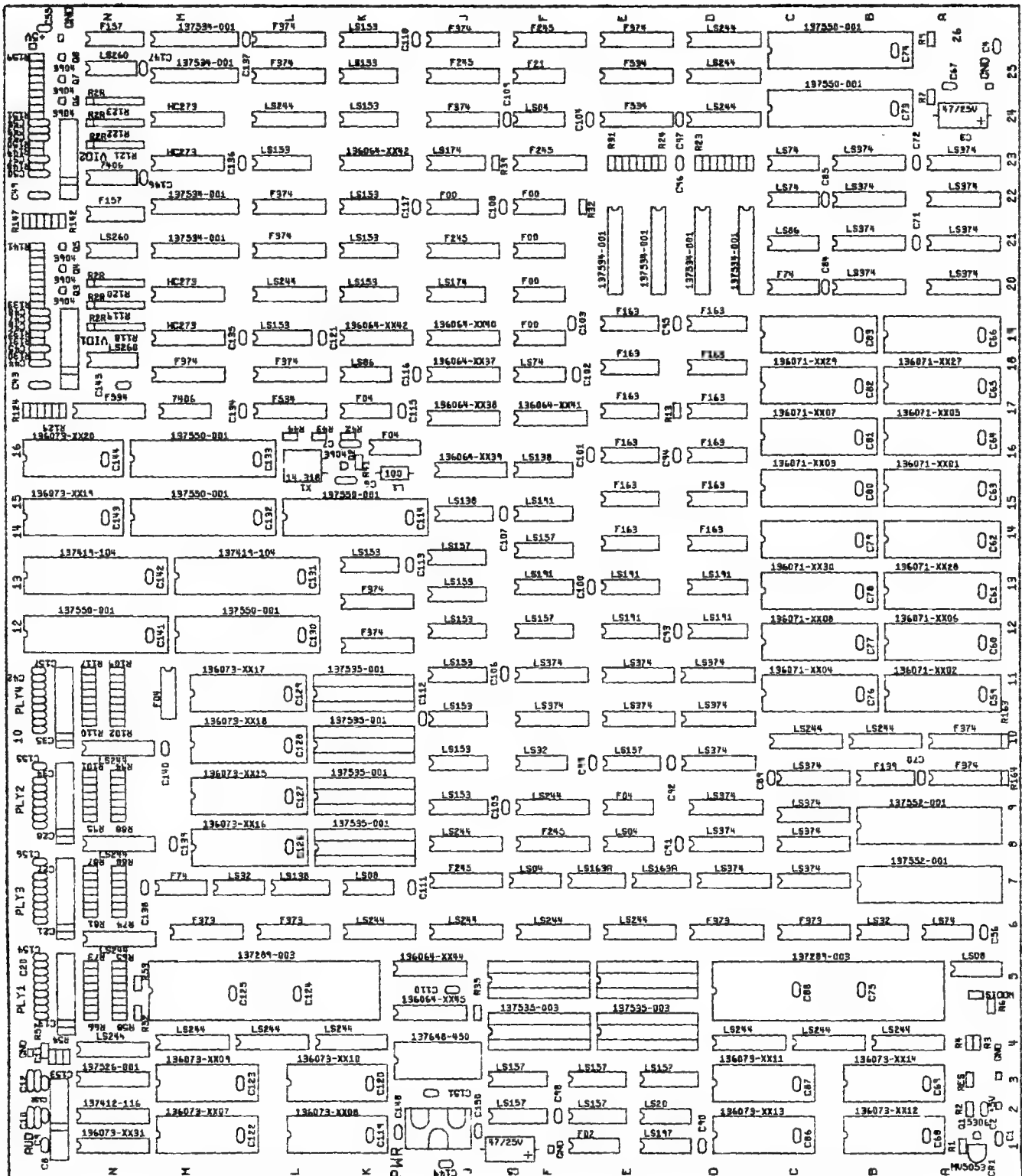
**Figure 4-2 Tournament Cyberball 2072 Game PCB Assembly
A047148-01 C**
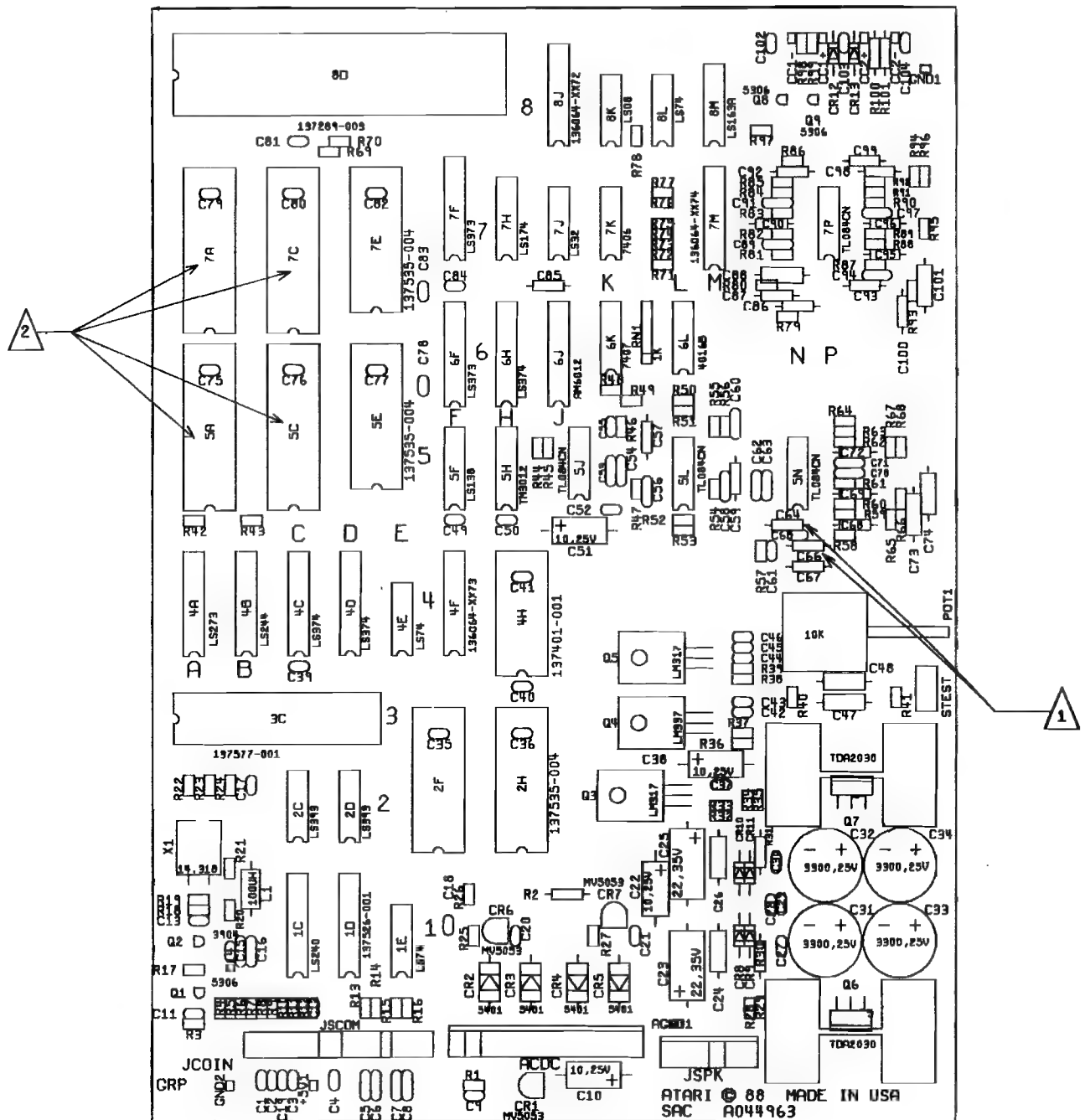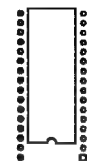
Figure 4-3 SAC (Sampled Audio Cruncher) PCB Assembly
A044963-22 D

N O T E S

Schematic Diagrams
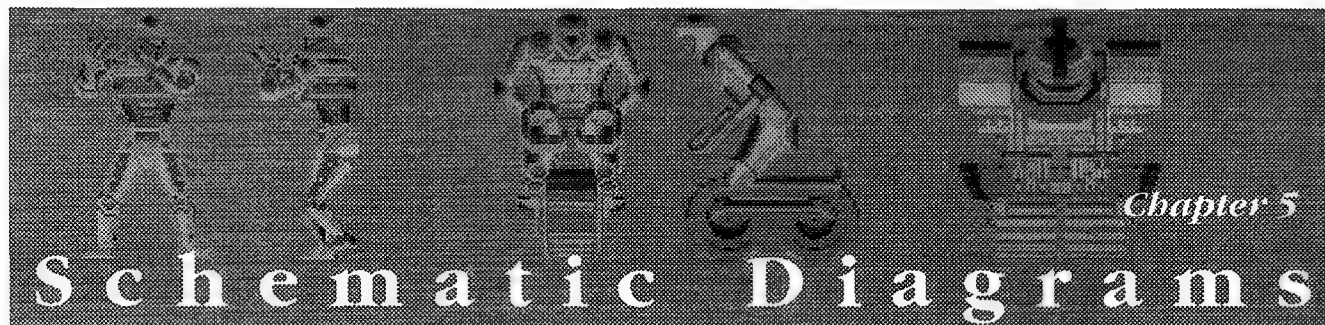
About this Chapter...

This chapter contains the schematics and wiring diagrams for your Tournament Cyberball® 2072 VS. Dual-System kit. They are arranged in the following order:

■ Hitron switching power supply

■ Audio power transformer

■ Game PCB

■ Memory map

■ Main wiring diagram

■ SAC PCB

The two PCB *assembly* drawings are illustrated in Chapter 4.

RAM and Communication Error Locations

Error Message[1]	Display Background	Location
P2[2]—Working RAM Bad	Red	4E, 4F
Video—Left RAM Bad	Green	9K, 11K
Video—Right RAM Bad	Green	8K, 10K
Color RAM—Left Bad	Black	21M, 22M
Color RAM—Right Bad	Black	25M, 26M
P2[2]—Common RAM Bad	Blue	4E, 4F
P2[2]—Detects Communications Error[3]	Purple	
P1[2]—Working RAM Bad	Red	4E, 4F
P1[2]—Common RAM Bad	Blue	4E, 4F
P1[2]—Detects Communications Error[3]	Purple	

[1] If two errors are detected, for instance, P2 finds the common RAM bad and P1 finds a communications error, then the screen may be split or may have only one color. However, both messages will appear, no matter what the display background is.

[2] P1 and P2 are the dual microprocessors.

[3] "Detects Communications Error" applies to communications problems other than the common RAM being bad.

ROM Error Locations

Micro-processor	Error Address	Location on Game PCB*	
P1	000000	U=1M	L=1K/L
P1	020000	U=3M	L=3K/L
P2	000000	U=3C/D	L=1B
P2	020000	U=1C/D	L=3B

*The error is identified as an upper or lower error (U or L) on the screen, after the word error.

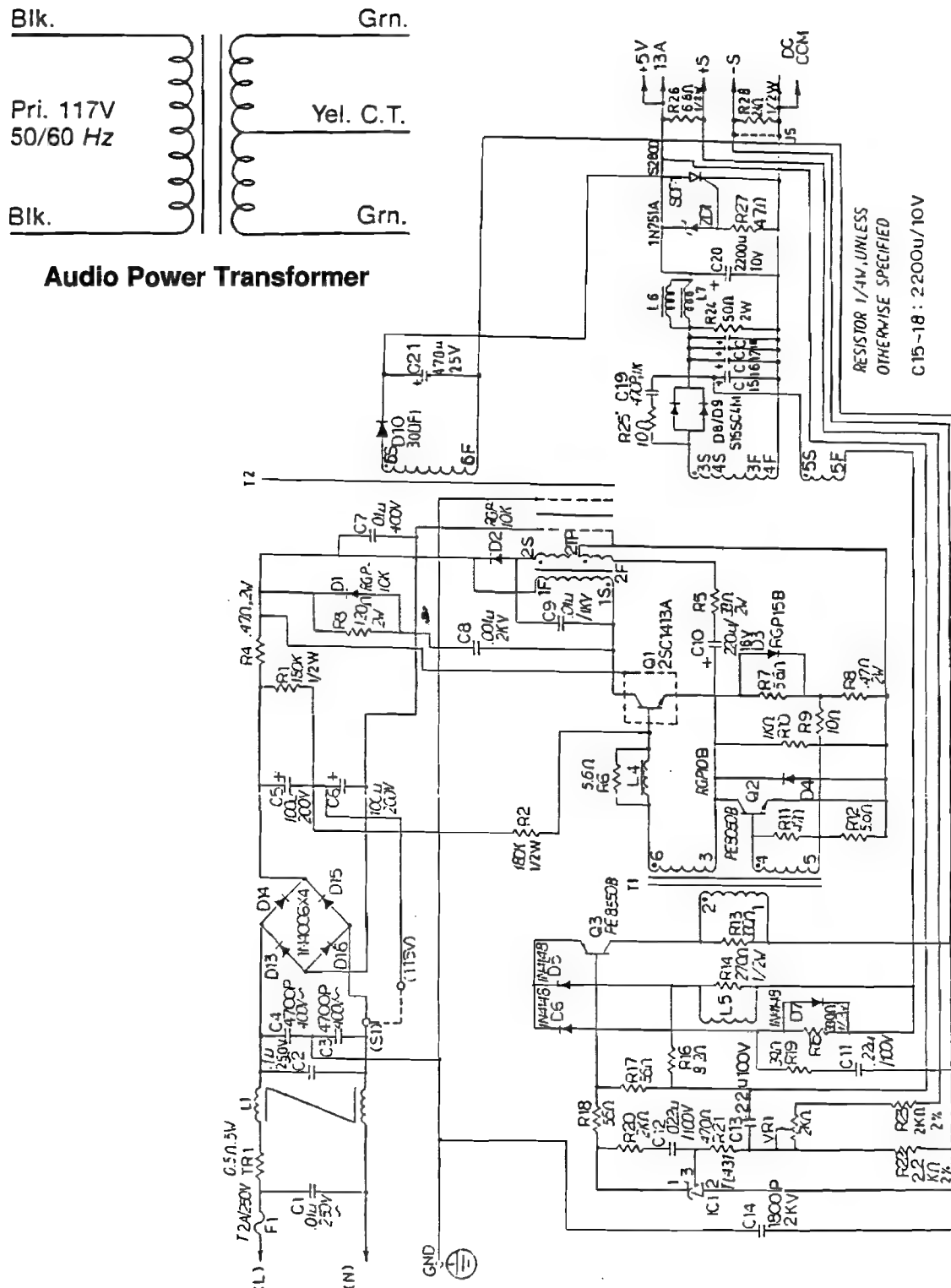**Figure 5-1 Faulty RAM/ROM Tables**

Audio Power Transformer

Figure 5-2 Hitron 5V, 13A Switching Power Supply, Audio Power Transformer

149006-001
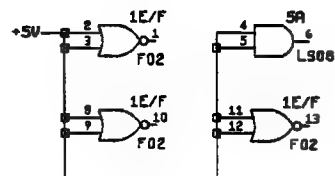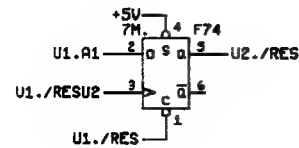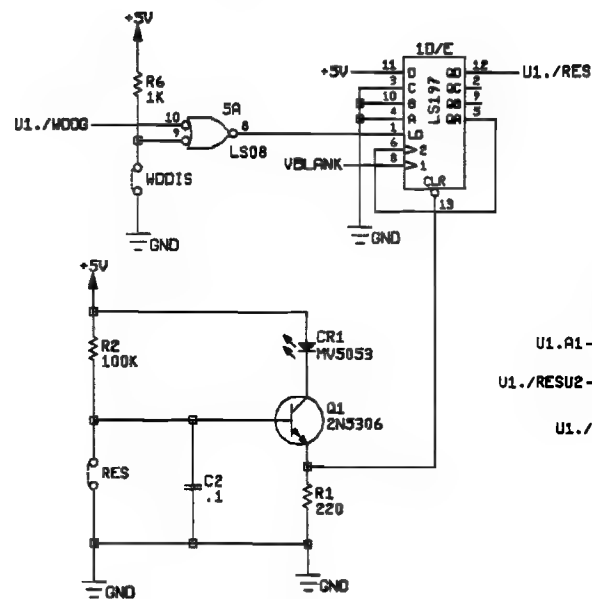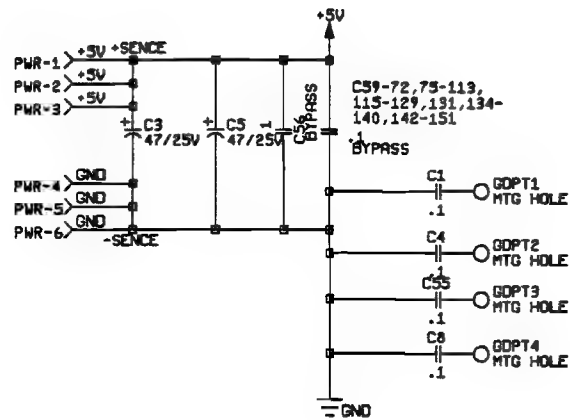
**Figure 5-3 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram,
Sheet 1 of 12**

047148-01 C

**Figure 5-4 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram,
Sheet 2 of 12**

047148-01 C

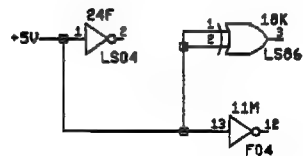**Figure 5-5 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram,
Sheet 3 of 12**

047148-01 C

Figure 5-6 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 4 of 12

047148-01 C

Figure 5-7 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 5 of 12

047148-01 C

Figure 5-8 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 6 of 12

047148-01 C

Figure 5-9 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 7 of 12

047148-01 C

**Figure 5-10 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram,
Sheet 8 of 12**
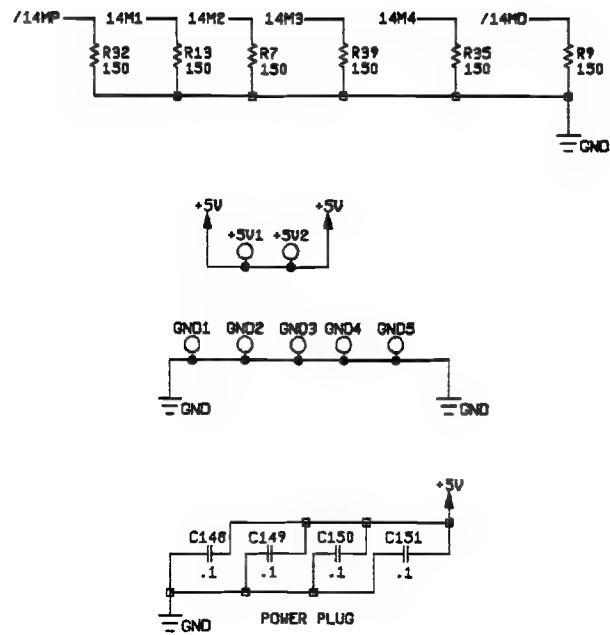
047148-01 C

+5V 14C VPP PGM NC ROM.D3
+5V 13C VPP PGM NC ROM.C3
+5V 12C VPP PGM NC ROM.B3
+5V 11C VPP PGM NC ROM.A3

M.A16 A16
MM.A15 A15
MM.A14 A14
MM.A13 A13
MM.A12 A12
MM.A11 A11
MM.A10 A10
MM.A9 A9
MM.A8 A8
MM.A7 A7 D7 M.R31
MM.A6 A6 D6 M.R30
MM.A5 A5 D5 M.R29
MM.A4 A4 D4 M.R28
MM.A3 A3 D3 M.R27
MM.A2 A2 D2 M.R26
MM.A1 A1 D1 M.R25
MM.A0 A0 D0 M.R24
CE OE
M./ROM3
M.A16

27-1M 250N

+5V 19C VPP PGM NC ROM.D2
+5V 18C VPP PGM NC ROM.C2
+5V 16/17C VPP PGM NC ROM.B2
+5V 15/16C VPP PGM NC ROM.A2

M.A16 A16
MM.A15 A15
MM.A14 A14
MM.A13 A13
MM.A12 A12
MM.A11 A11
MM.A10 A10
MM.A9 A9
MM.A8 A8
MM.A7 A7 D7 M.R23
MM.A6 A6 D6 M.R22
MM.A5 A5 D5 M.R21
MM.A4 A4 D4 M.R20
MM.A3 A3 D3 M.R19
MM.A2 A2 D2 M.R18
MM.A1 A1 D1 M.R17
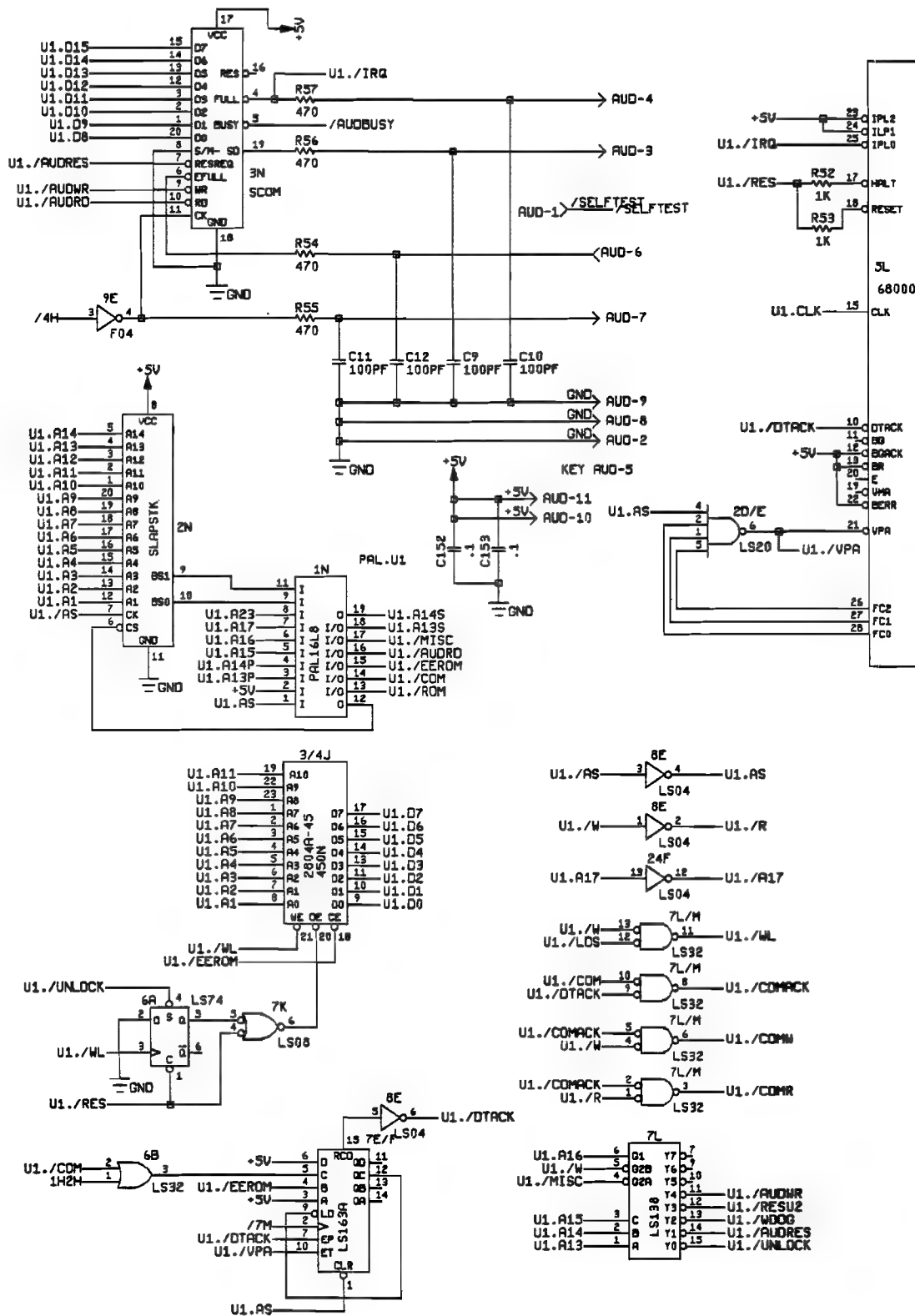MM.A0 A0 D0 M.R16
CE OE
M./ROM3
M.A16

27-1M 250N

**Figure 5-11 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram,
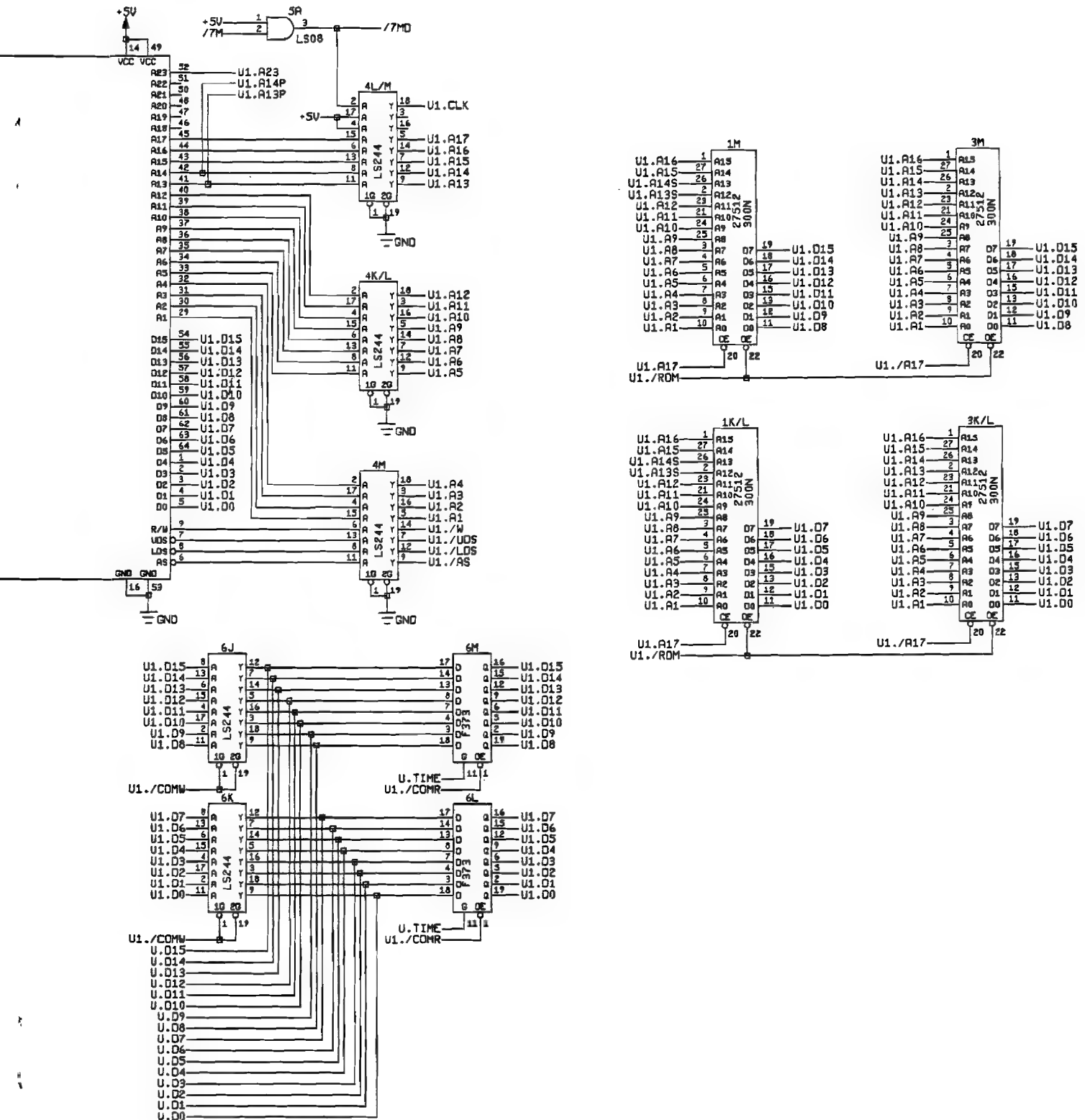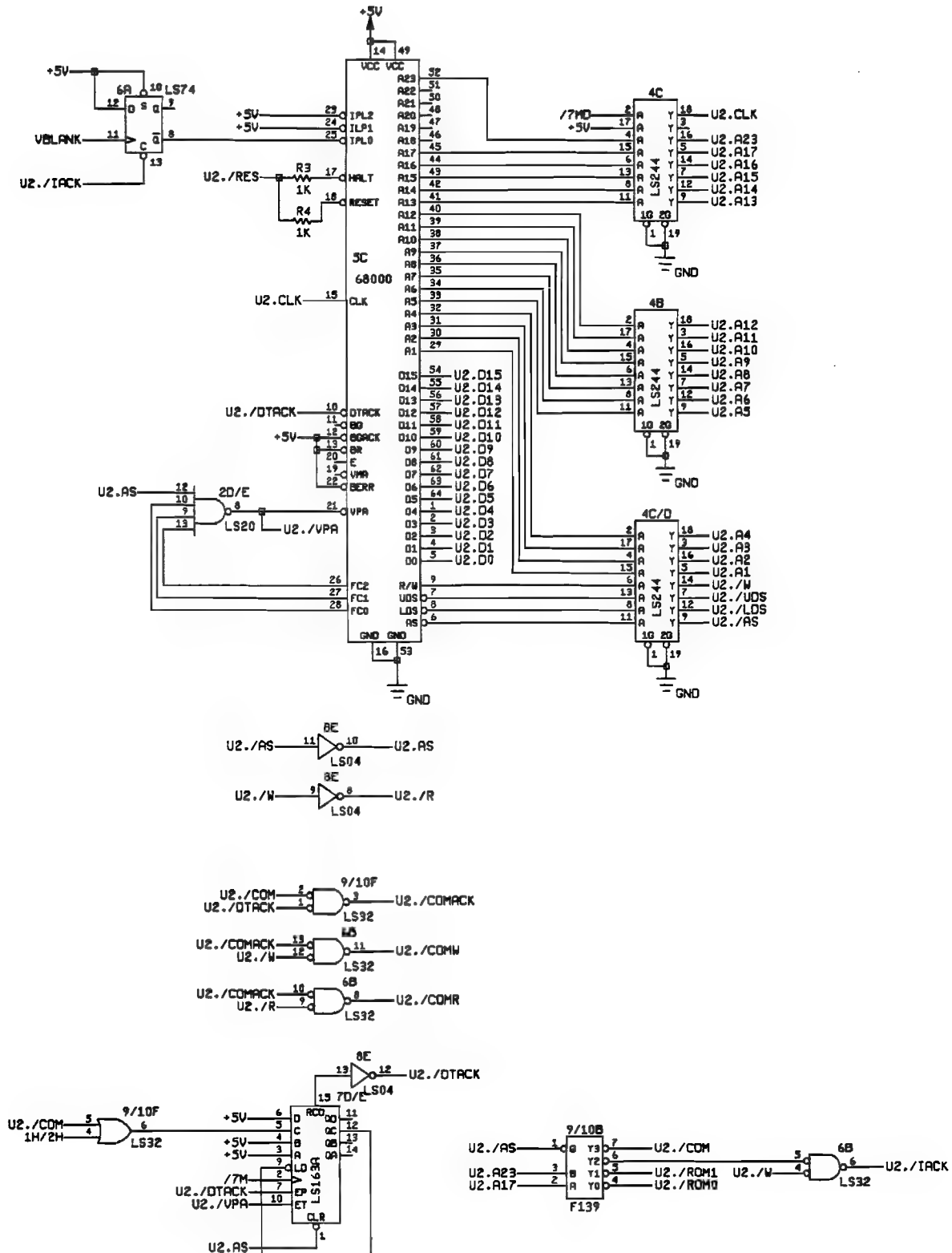Sheet 9 of 12**

047148-01 C

Figure 5-12 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 10 of 12
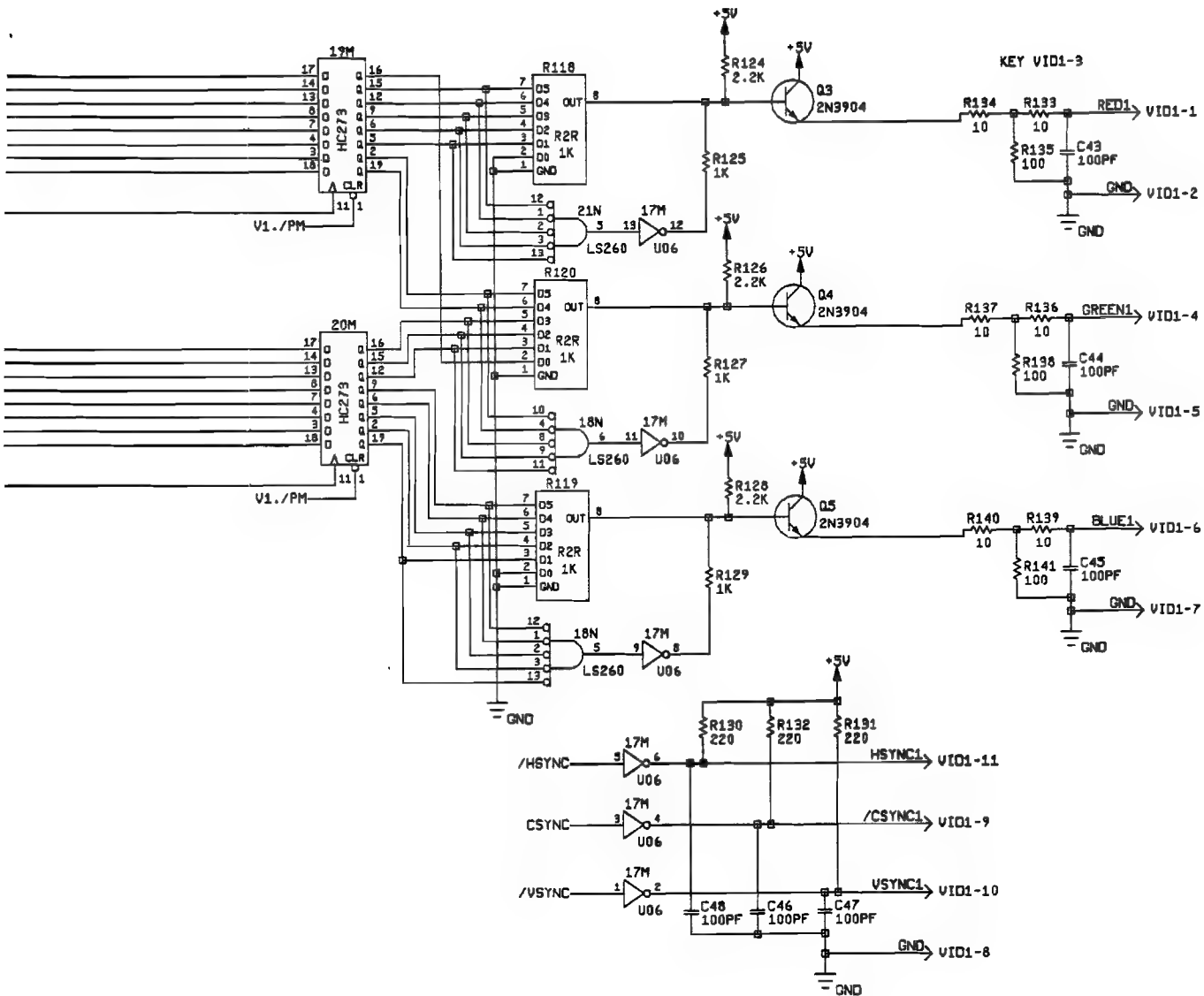
047148-01 C

Figure 5-13 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 11 of 12

047148-01 C
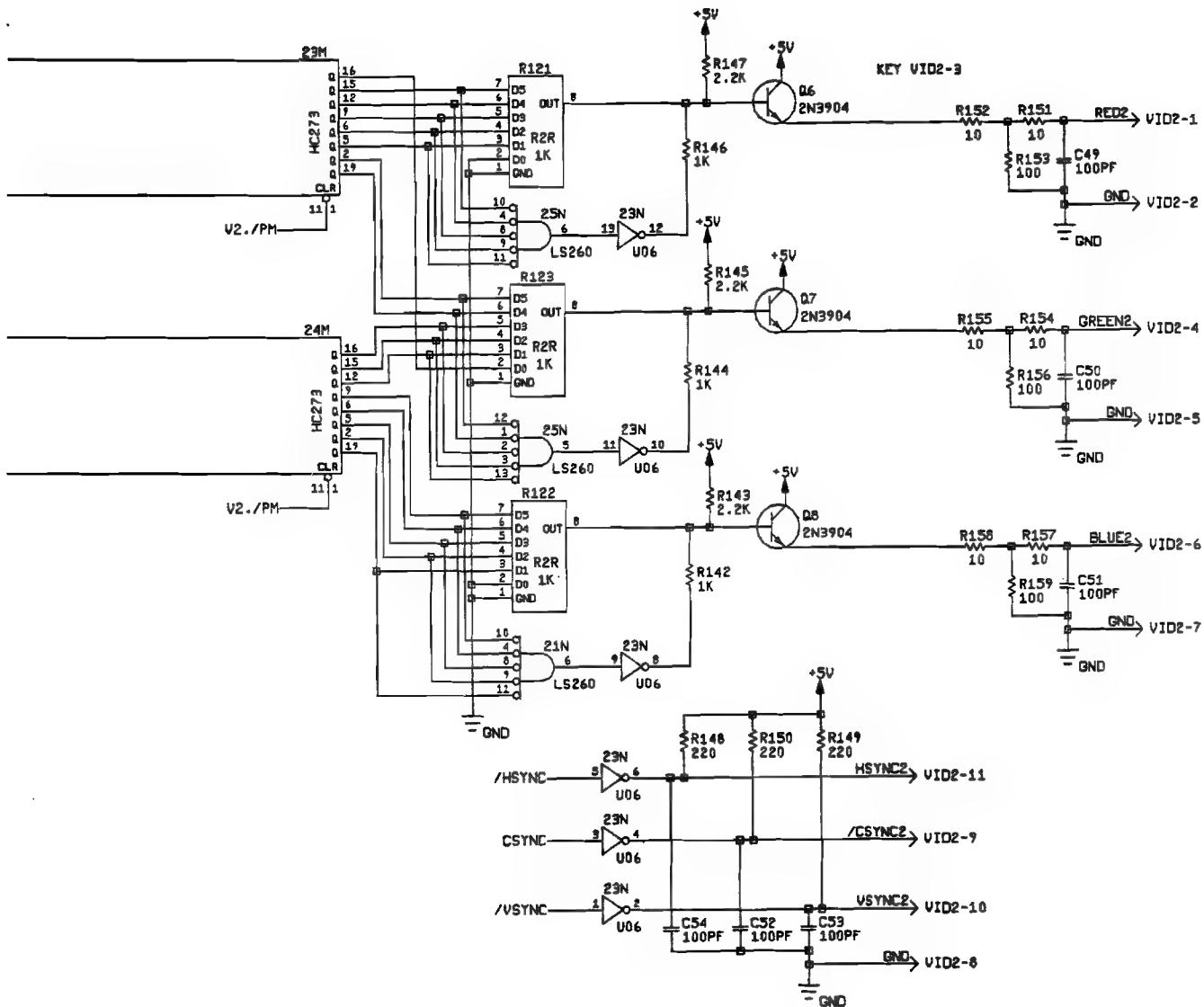
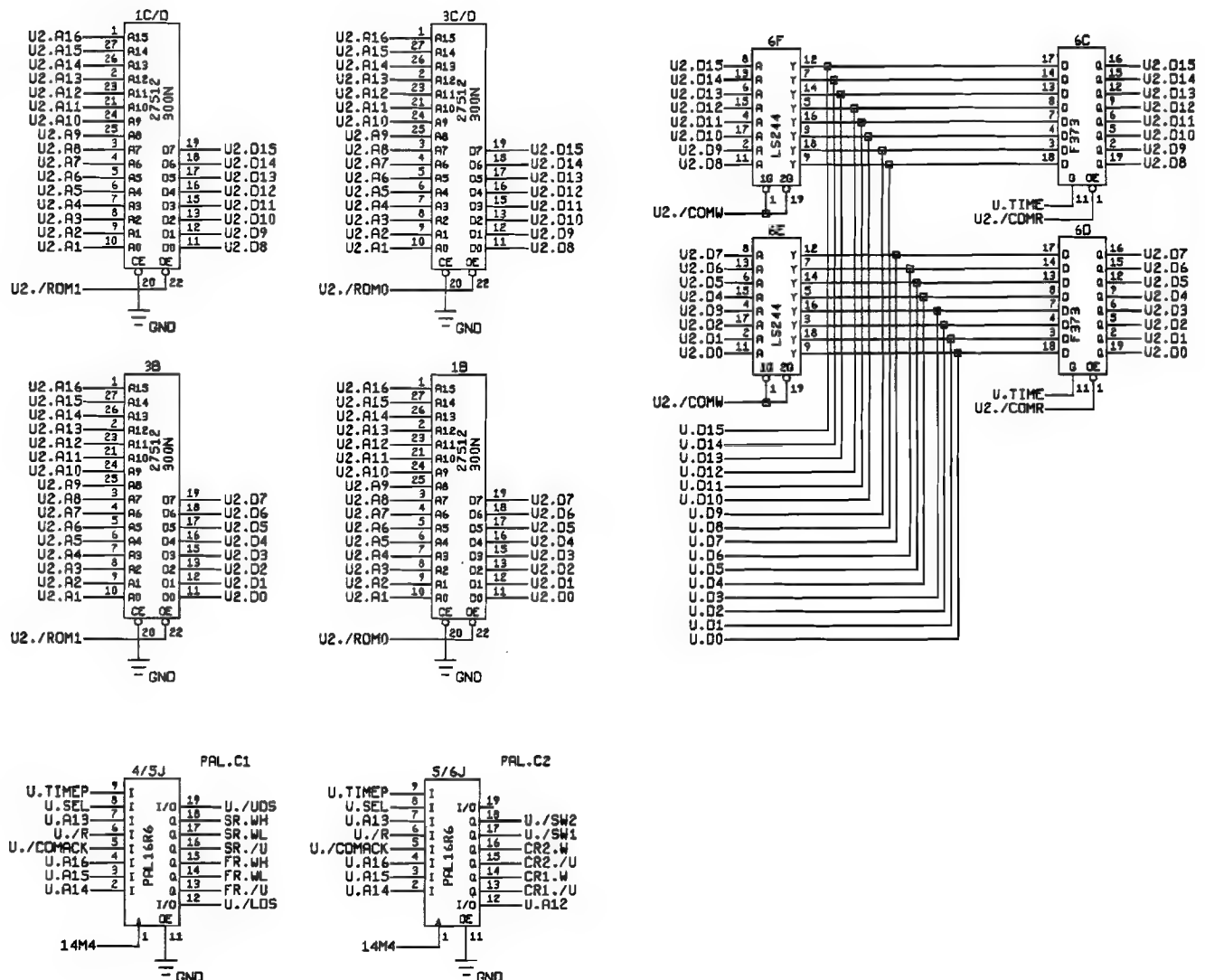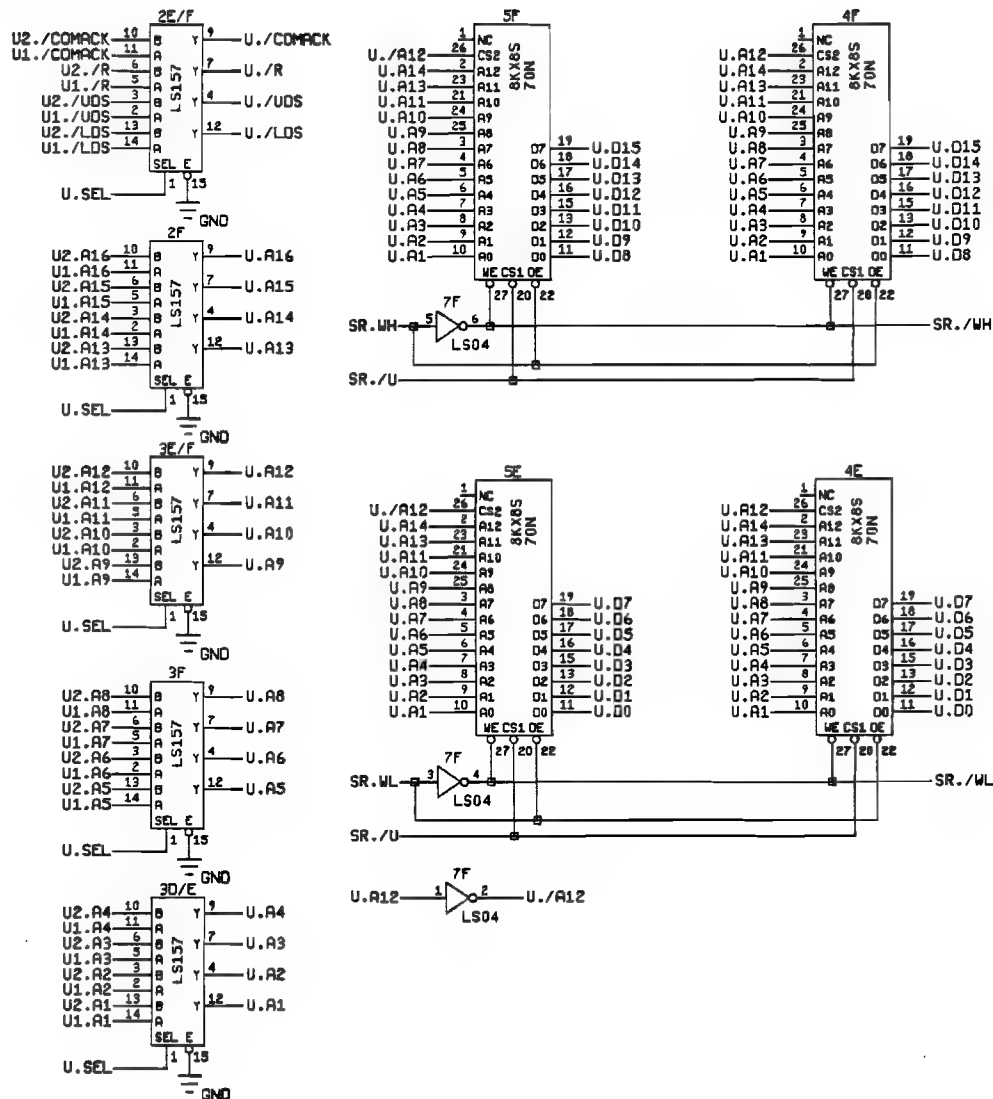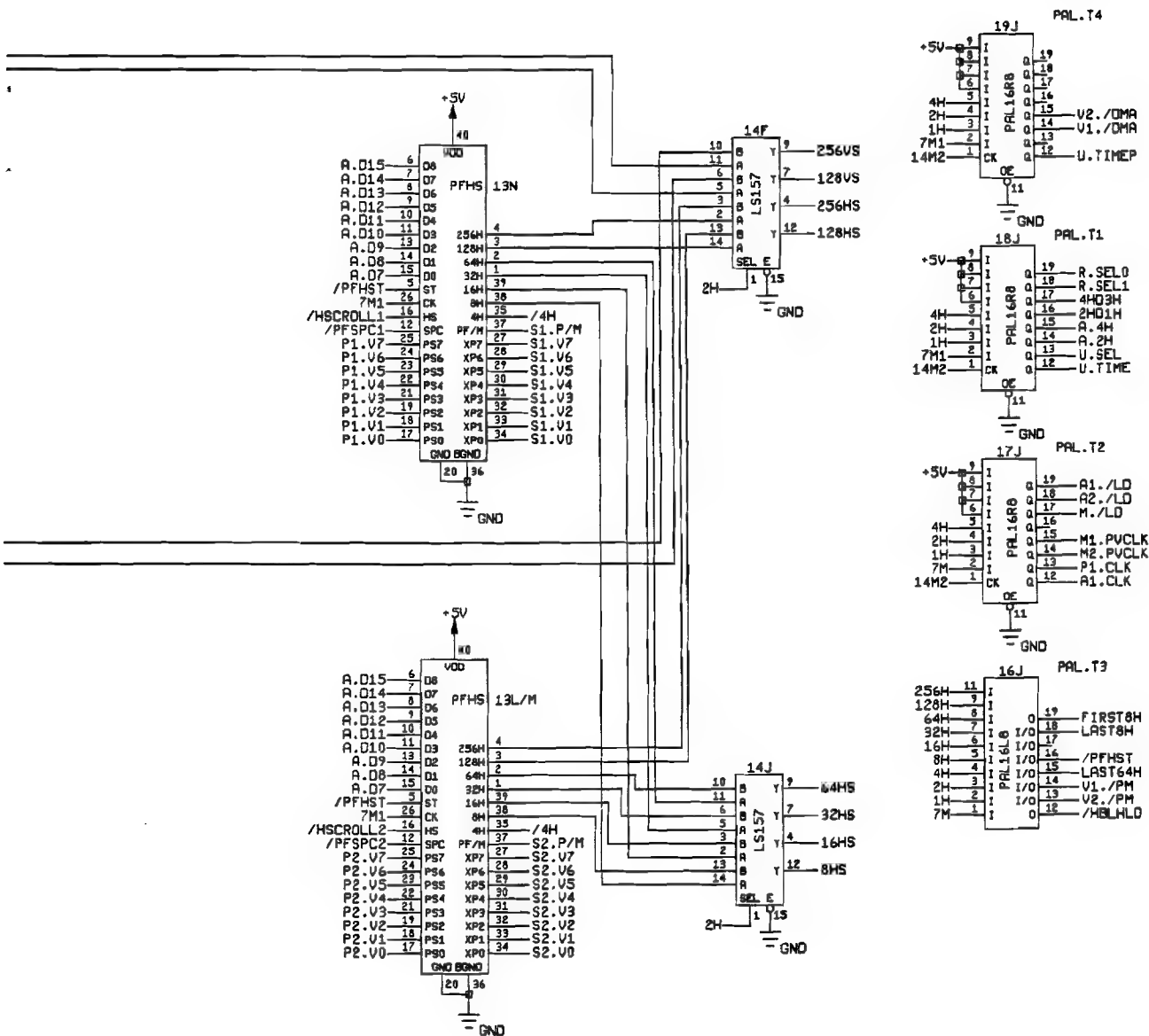**Figure 5-14 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram, Sheet 12a of 12**
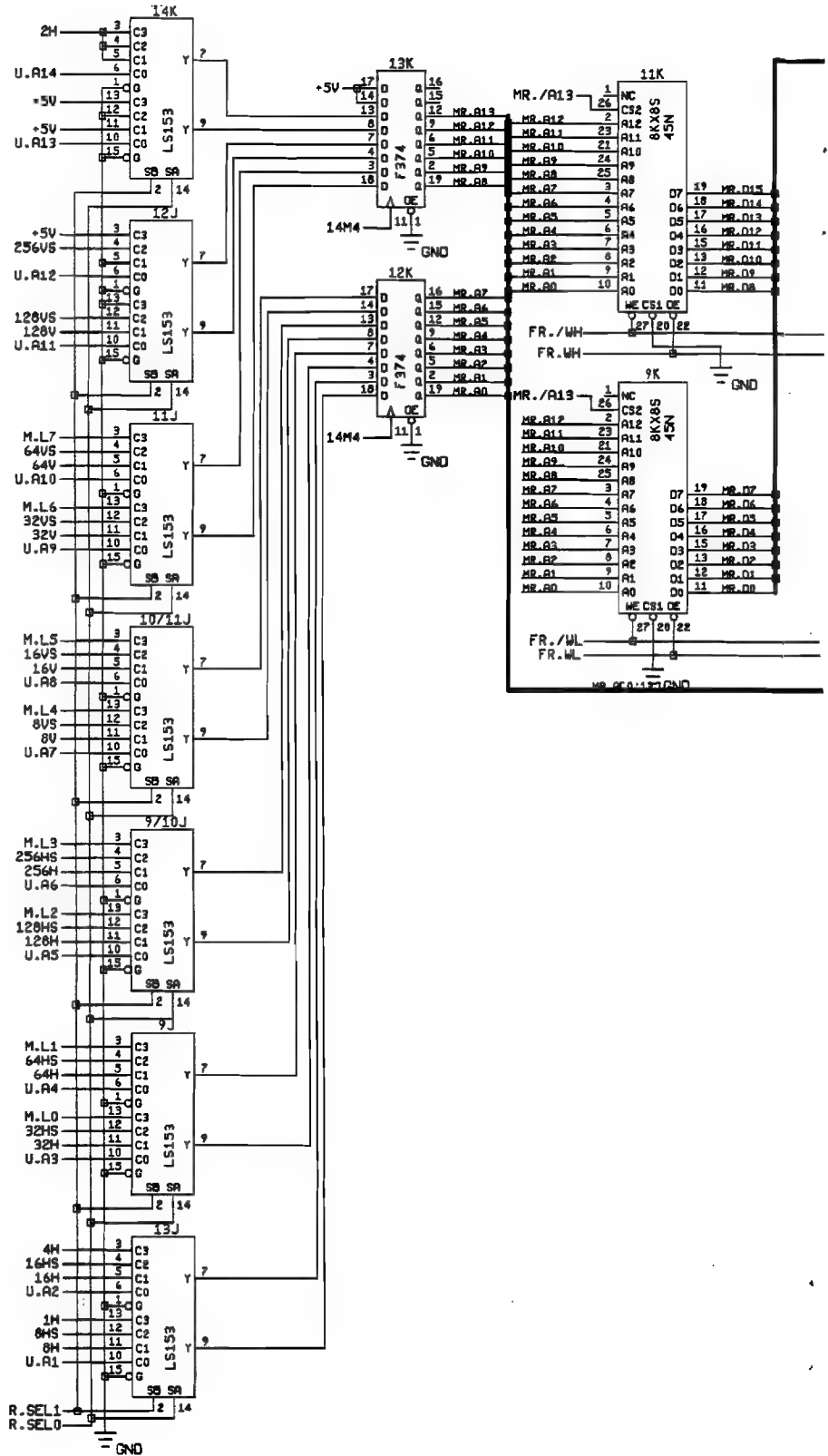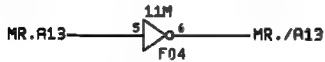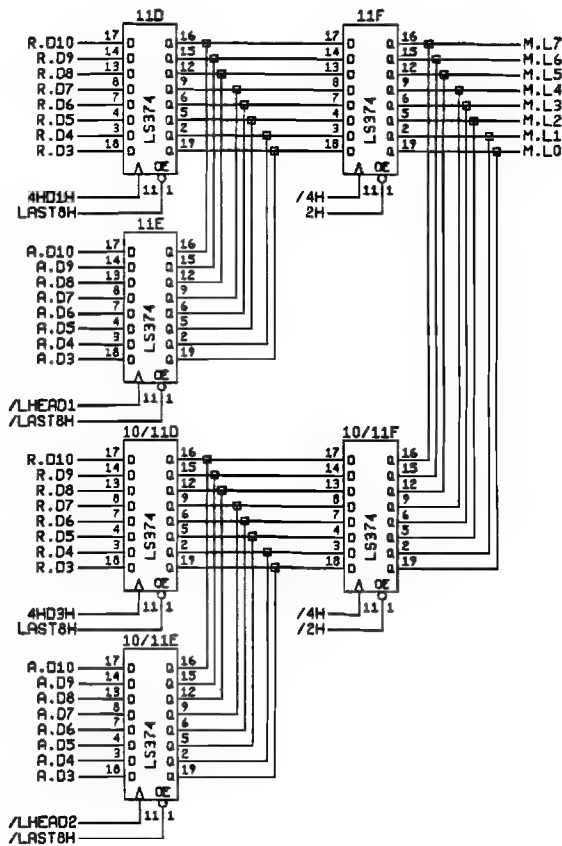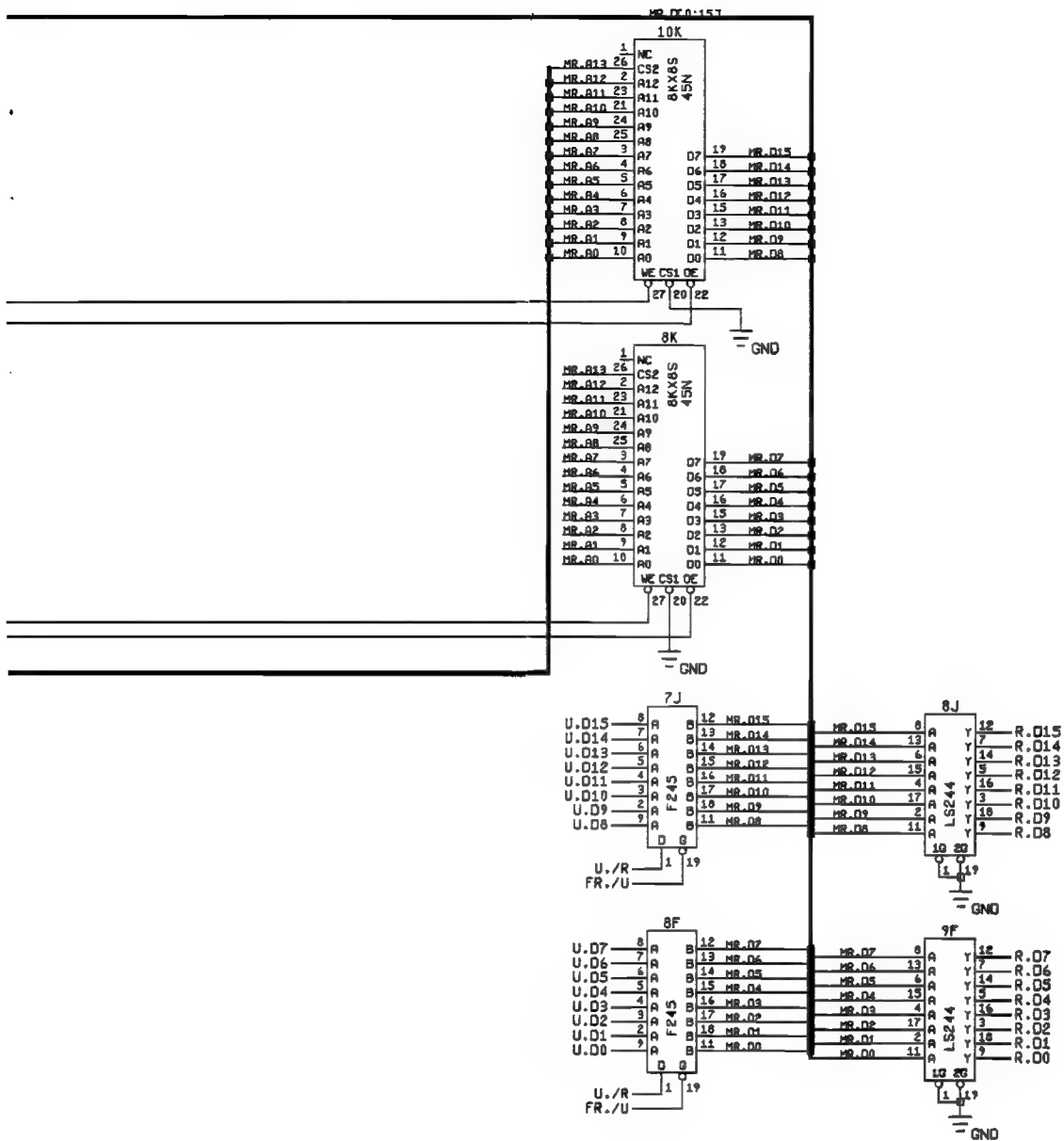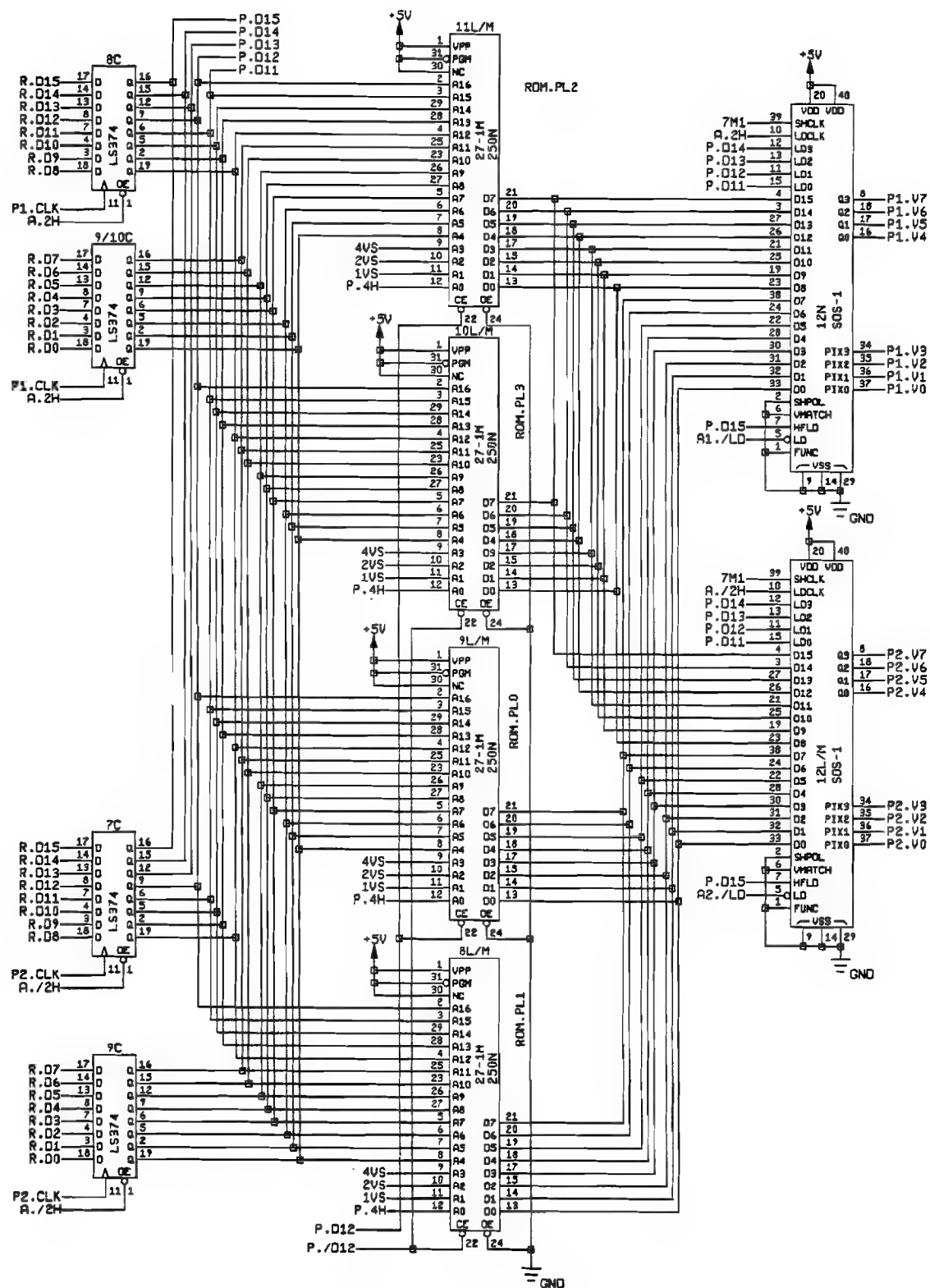
047148-01 C

5F.S

8KX8 70N

U./A12 26 NC / CS2
U.A14 2 A12
U.A13 23 A11
U.A11 21 A10
U.A10 24 A9
U.A9 25 A8
U.A8 3 A7   D7 19 U.D15
U.A7 4 A6   D6 18 U.D14
U.A6 5 A5   D5 17 U.D13
U.A5 6 A4   D4 16 U.D12
U.A4 7 A3   D3 15 U.D11
U.A3 8 A2   D2 13 U.D10
U.A2 9 A1   D1 12 U.D9
U.A1 10 A0   D0 11 U.D8

WE CS1 OE
27 20 22
SR./WH
SR./U
SR.WH

4F.S

8KX8 70N

U.A12 26 NC / CS2
U.A14 2 A12
U.A13 23 A11
U.A11 21 A10
U.A10 24 A9
U.A9 25 A8
U.A8 3 A7   D7 19 U.D15
U.A7 4 A6   D6 18 U.D14
U.A6 5 A5   D5 17 U.D13
U.A5 6 A4   D4 16 U.D12
U.A4 7 A3   D3 15 U.D11
U.A3 8 A2   D2 13 U.D10
U.A2 9 A1   D1 12 U.D9
U.A1 10 A0   D0 11 U.D8

WE CS1 OE
27 20 22
SR./WH
SR./U
SR.WH

5E.S

8KX8 70N

U./A12 26 NC / CS2
U.A14 2 A12
U.A13 23 A11
U.A11 21 A10
U.A10 24 A9
U.A9 A8
U.A8 3 A7   D7 19 U.D7
U.A7 4 A6   D6 18 U.D6
U.A6 5 A5   D5 17 U.D5
U.A5 6 A4   D4 16 U.D4
U.A4 7 A3   D3 15 U.D3
U.A3 8 A2   D2 13 U.D2
U.A2 9 A1   D1 12 U.D1
U.A1 10 A0   D0 11 U.D0

WE CS1 OE
27 20 22
SR./WL
SR./U
SR.WL

4E.S

8KX8 70N

U.A12 26 NC / CS2
U.A14 2 A12
U.A13 23 A11
U.A11 21 A10
U.A10 24 A9
U.A9 25 A8
U.A8 3 A7   D7 19 U.D7
U.A7 4 A6   D6 18 U.D6
U.A6 5 A5   D5 17 U.D5
U.A5 6 A4   D4 16 U.D4
U.A4 7 A3   D3 15 U.D3
U.A3 8 A2   D2 13 U.D2
U.A2 9 A1   D1 12 U.D1
U.A1 10 A0   D0 11 U.D0

WE CS1 OE
27 20 22
SR./WL
SR./U
SR.WL

+5V

C146 C147 C137 C136 C135 C121 C145 C134 C133 C132 C72 C71 C76 C77 C78 C79 C80 C81 C82 C83
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1

C144 C143 C142 C141 C131 C130 C129 C140 C139 C128 C66 C65 C64 C63 C62 C61 C60 C90 C89
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1

C127 C126 C125 C124 C123 C122 C120 C119 C110 C111 C70 C75 C88 C87 C86 C69 C68
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1

C105 C98 C91 C115 C114 C113 C112 C106 C107 C101 C67 C138
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1

C100 C99 C92 C93 C94 C118 C117 C116 C102 C108
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1

C109 C103 C95 C104 C96 C97 C74 C73 C85 C84
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1

GND

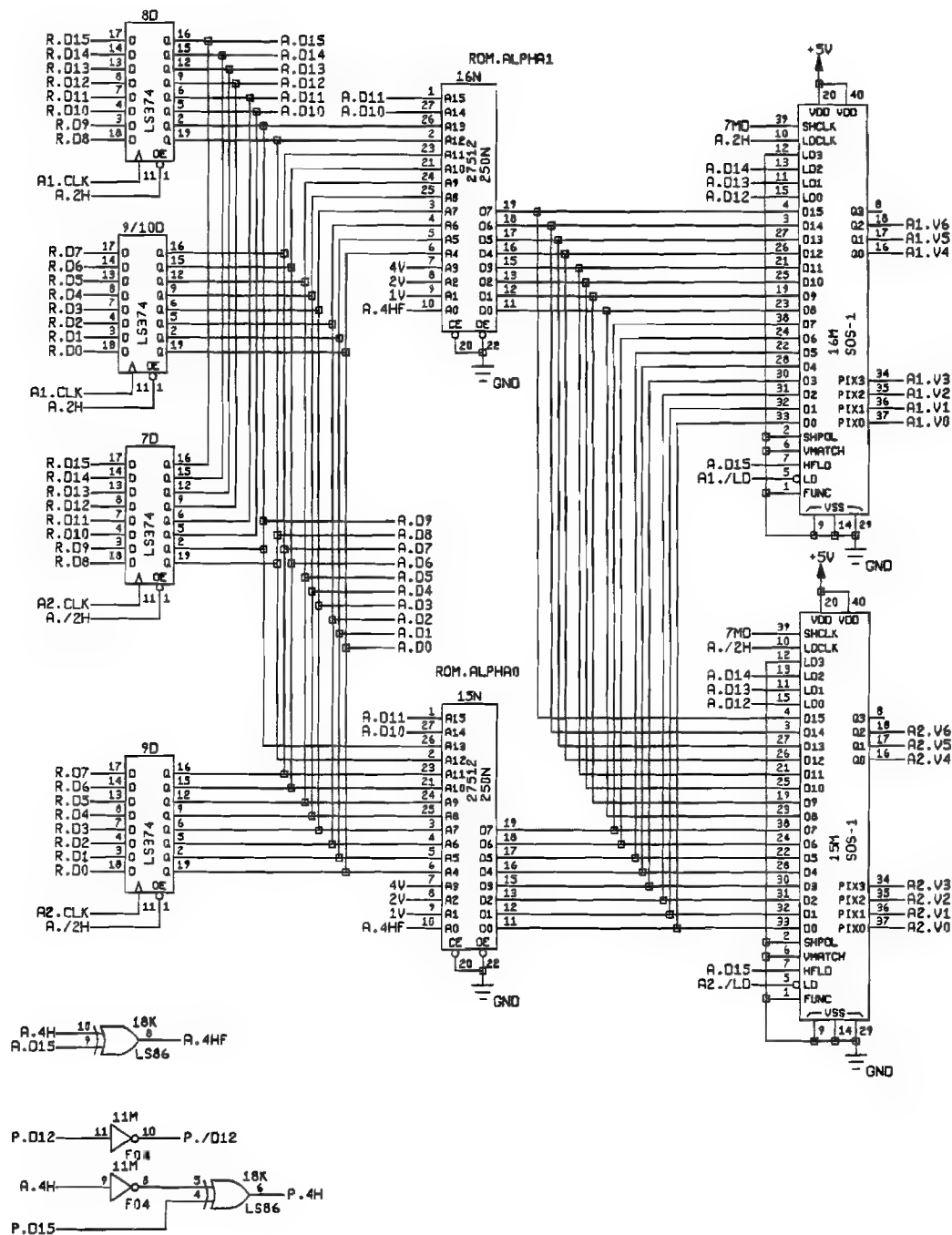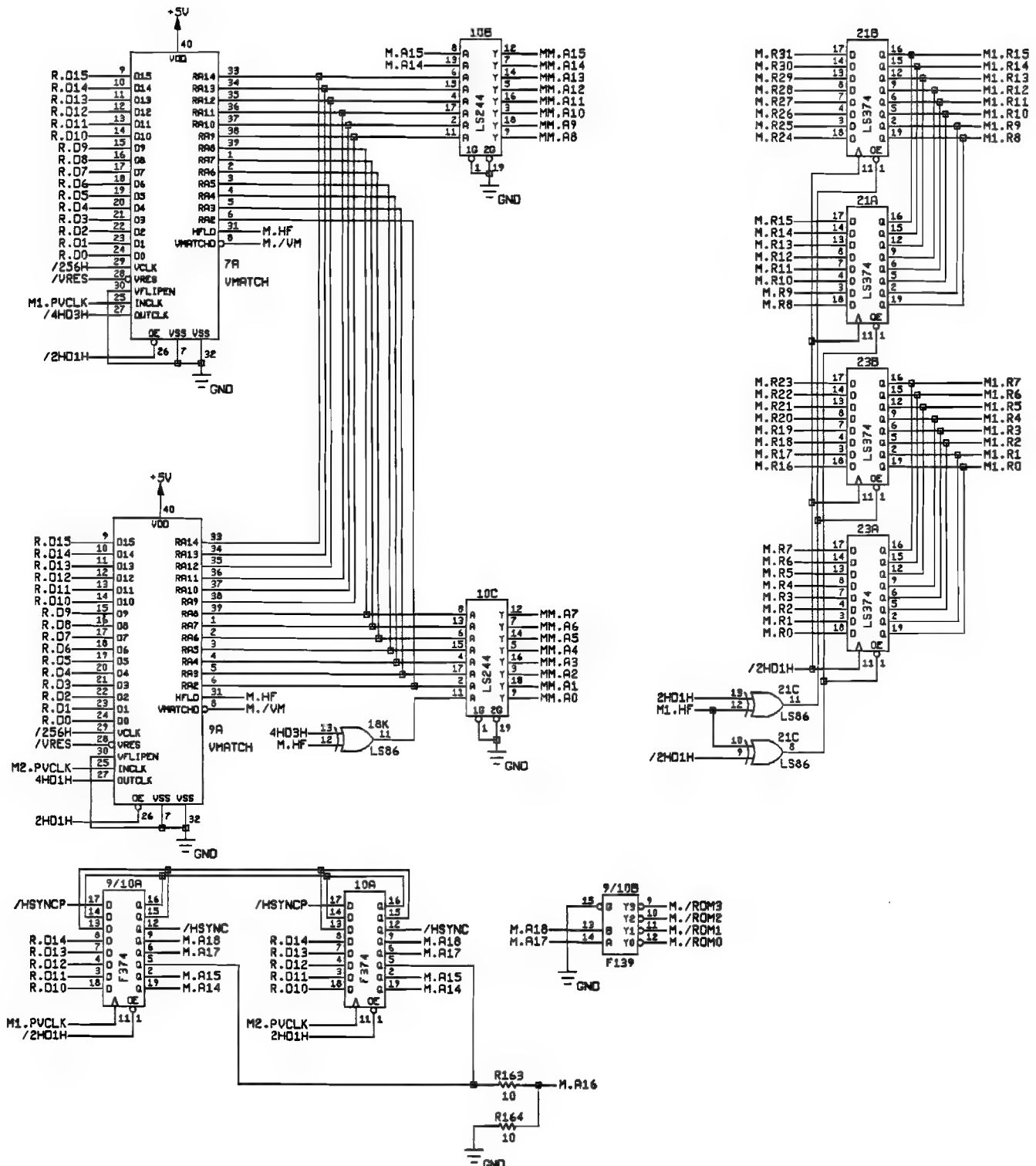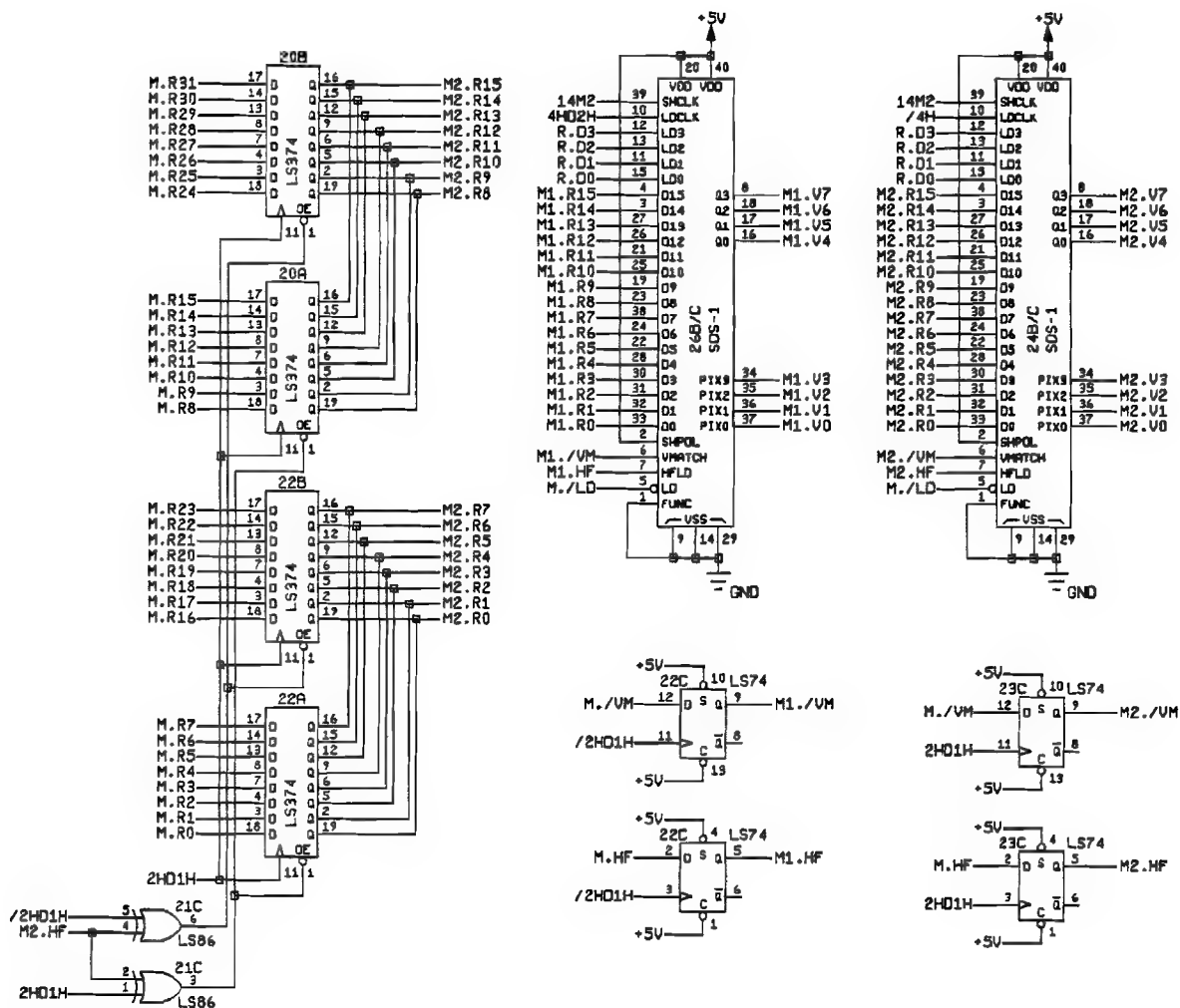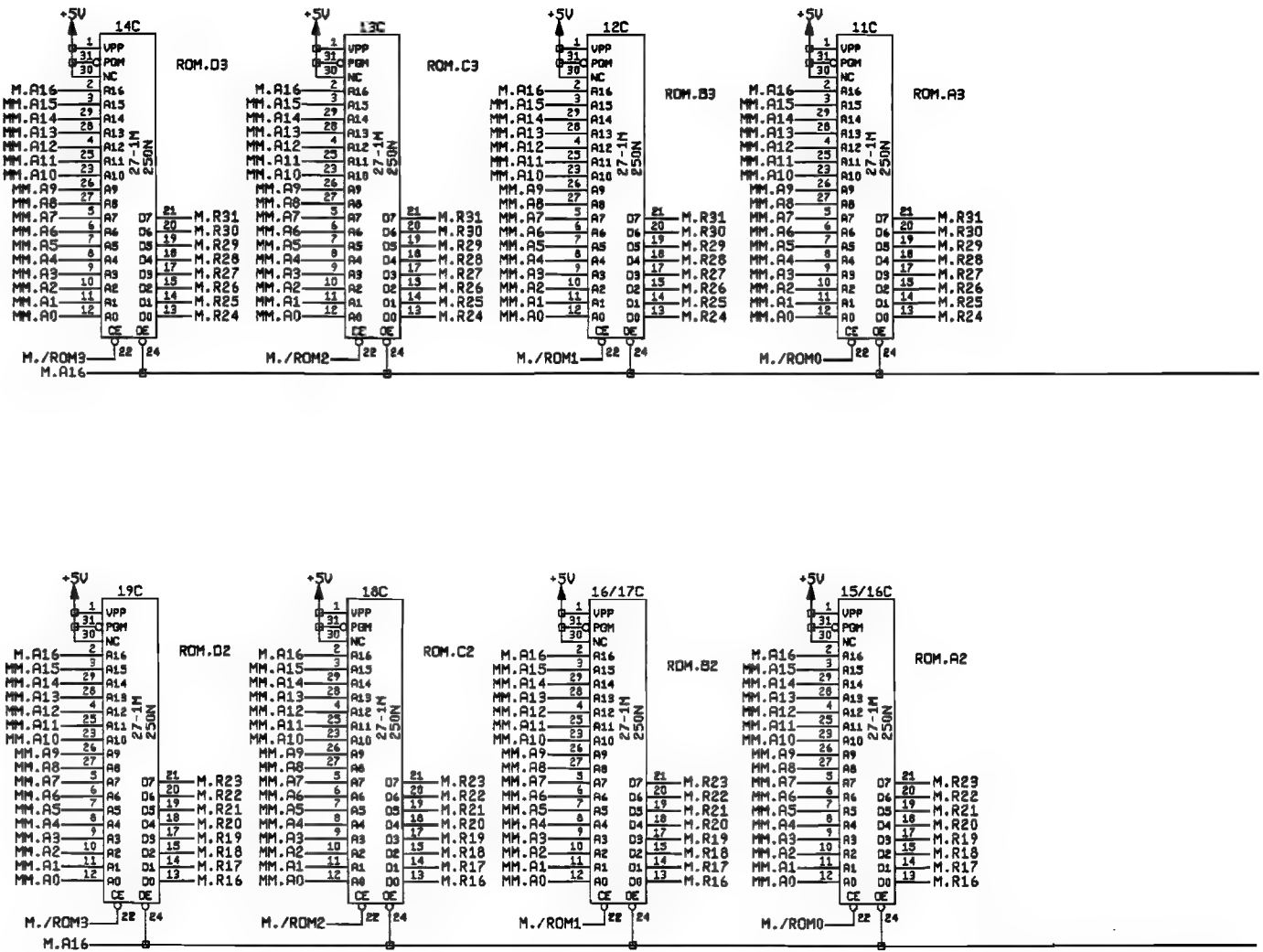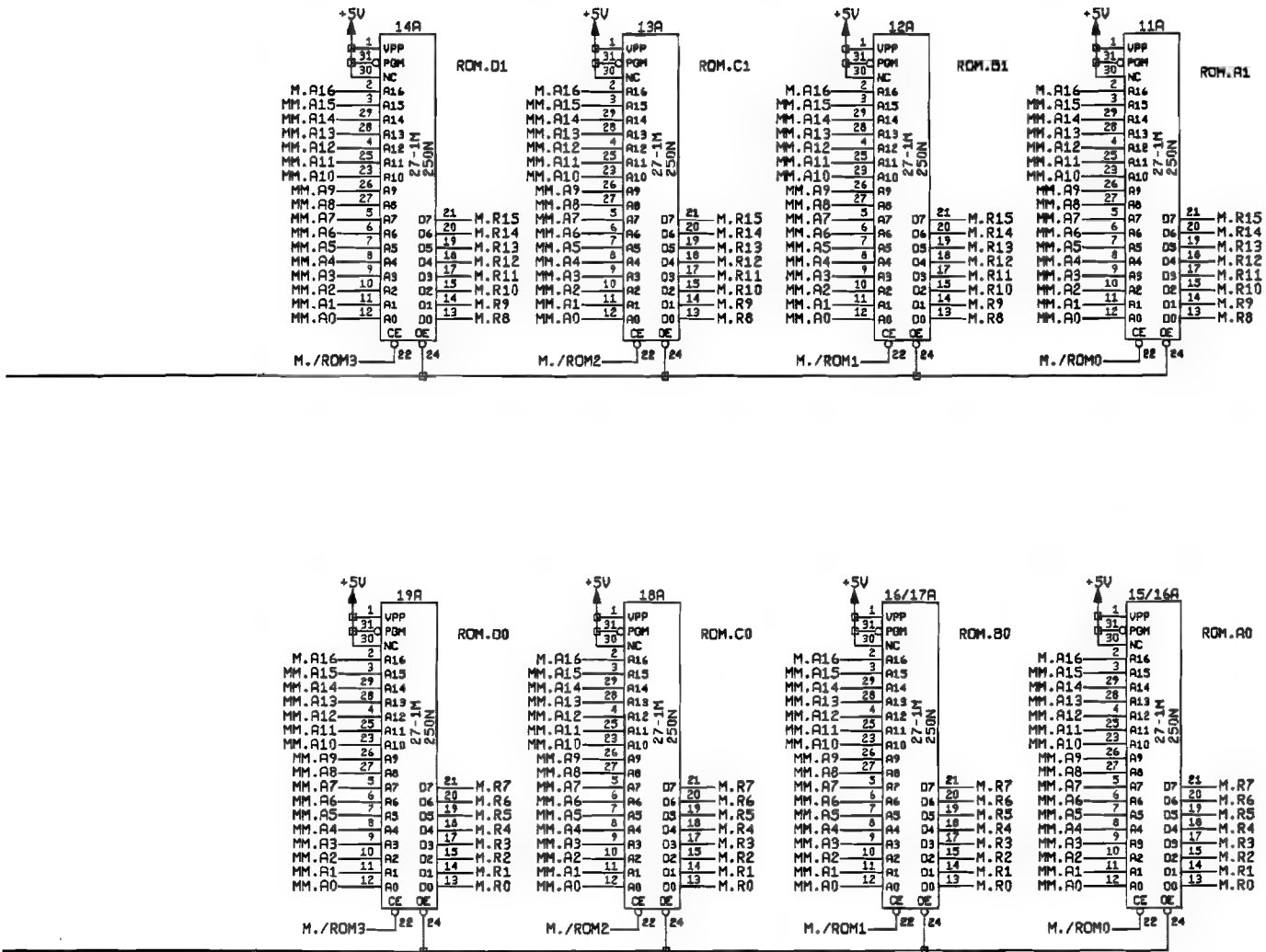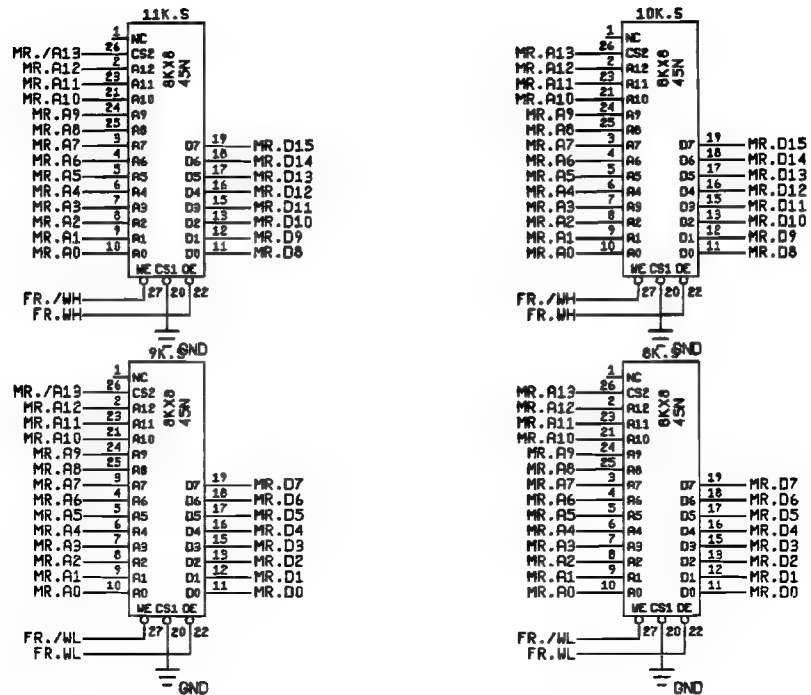**Figure 5-14 Tournament Cyberball 2072 Game PCB Assembly Schematic Diagram,
Sheet 12b of 12**

047148-01 C

Memory Map
Main Processor (P1)

Every time the main processor (P1) is reset, the video processor (P2) is also reset. P1 must clear P2's reset.

ADDRESS	SIZE		ADDRESS BUS 2222 1111 1111 1100 0000 0000 3210 9876 5432 1098 7654 3210	R/W	DATA BUS 1111 1100 0000 0000 5432 1098 7654 3210	FUNCTION
000000-007FFF	16KW		0--- -000 0AAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	SHORT ABSOLUTE PROGRAM PROM
008000-00FFFF	16KW		0--- -000 1AAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	SLAPSTIC PROGRAM PROM
010000-03FFFF	96KW		0--- -0AA AAAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	LONG ABSOLUTE PROGRAM PROM
040000-07FFFF	28KW		0--- -1AA AAAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	UNIMPLEMENTED PROGRAM PROM
FC0000-FC03FE	512B		1--- --00 0--- --AA AAAA AAA0	R/W	DDDD DDDD	EEROM
FC8000			1--- --00 1--- ---- ---- ----	R	DDDD DDDD	AUDIO READ
FD0000			1--- --01 000- ---- ---- ----	W		FEROM UNLOCK
FD2000			1--- --01 001- ---- ---- ----	W		AUDIO RESET
FD4000			1--- --01 010- ---- ---- ----	W		WATCH DOG
FD6000			1--- --01 011- ---- ---- --A-	W		RESET P2 (ACTIVE LOW)
FD8000			1--- --01 100- ---- ---- ----	W	DDDD DDDD	AUDIO WRITE
FE0000			1--- --10 0-00 ---- ---- ----	R	DDDD DDDD DDDD DDDD	SWITCH 1 (TEAM 1)
					D	SELF TEST
					D	UNUSED
					D	RIGHT ACTION
					D	FREEZE (DEVELOPMENT ONLY)
					DDDD	RIGHT PLAYER JOYSTICK (L,R,D,U)
					DD	UNUSED
					D	LEFT ACTION
					D	STEP (DEVELOPMENT ONLY)
					DDDD	LEFT PLAYER JOYSTICK (L,R,D,U)
FE1000			1--- --10 0-01 ---- ---- ----	R	DDDD DDDD DDDD DDDD	SWITCH 2 (TEAM 2)
					D	VBLANK
					D	UNUSED
					D	RIGHT ACTION
					D	REPLAY (DEVELOPMENT ONLY)
					DDDD	RIGHT PLAYER JOYSTICK (L,R,D,U)
					DD	UNUSED
					D	LEFT ACTION
					D	UNUSED
					DDDD	LEFT PLAYER JOYSTICK (L,R,D,U)
FE8000-FE8FFE	2KW		1--- --10 10-- AAAA AAAA AAA0	R/W	DDDD DDDD DDDD DDDD	COLORAM 1
FEC000-FECFFE	2KW		1--- --10 11-- AAAA AAAA AAA0	R/W	DDDD DDDD DDDD DDDD	COLORAM 2
FF0000-FF1FFF	KW		1--- --11 000A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	PLAYFIELD 1 PARAMETER RAM
FF2000-FF2FFF	2KW		1--- --11 0010 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	ALPHANUMERICS 1 PARAMETER RAM
FF3000-FF3FFF	2KW		1--- --11 0011 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	MOTION OBJECTS 1 PARAMETER RAM
FF4000-FF5FFF	4KW		1--- --11 010A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	PLAYFIELD 2 PARAMETER RAM
FF6000-FF6FFF	KW		1--- --11 0110 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	ALPHANUMERICS 2 PARAMETER RAM
FF7000-FF7FFF	2KW		1--- --11 0111 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	MOTION OBJECTS 2 PARAMETER RAM
FF8000-FF9FFF	4KW		1--- --11 100A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	COMMUNICATIONS RAM
FFA000-FFBFFF	KW		1--- --11 101A AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	P2 PROTECTED PROGRAM RAM
FFC000-FFFFFF	8KW		1--- --11 11AA AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	P1 PROTECTED PROGRAM RAM

Memory Map
Video Processor (P2)

Everytime the main processor (P1) is reset, the video processor (P2) is also reset. P1 must clear P2's reset.

		ADDRESS BUS		DATA BUS	
ADDRESS	SIZE	2222 1111 1111 1100 0000 0000 3210 9876 5432 1098 7654 3210	R/W	1111 1100 0000 0000 5432 1098 7654 3210	FUNCTION
000000-007FFF	16KW	0--- -000 0AAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	SHORT ABSOLUTE PROGRAM PROM
008000-03FFFF	112KW	0--- -0AA AAAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	LONG ABSOLUTE PROM
040000-07FFFF	128KW	0--- -1AA AAAA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	UNIMPLEMENTED PROGRAM PROM
FC0000		1--- --0- ---- ---- ---- ----	W		SCREEN INTERRUPT ACKNOWLEDGE
FE0000		1--- --10 0-00 ---- ---- ----	R	DDDD DDDD DDDD DDDD	SWITCH 1 (TEAM 1)
				D	SELF-TEST
				D	UNUSED
				D	RIGHT ACTION
				D	FREEZE (DEVELOPMENT ONLY)
				DDDD	RIGHT PLAYER JOYSTICK (L,R,D,U)
				DD	UNUSED
				D	LEFT ACTION
				D	STEP (DEVELOPMENT ONLY)
				DDDD	LEFT PLAYER JOYSTICK (L,R,D,U)
FE1000		1--- --10 0-01 ---- ---- ----	R	DDDD DDDD DDDD DDDD	SWITCH 2 (TEAM 2)
				D	VBLANK
				D	UNUSED
				D	RIGHT ACTION
				D	REPLAY (DEVELOPMENT ONLY)
				DDDD	RIGHT PLAYER JOYSTICK (L,R,D,U)
				DD	UNUSED
				D	LEFT ACTION
				D	UNUSED
				DDDD	LEFT PLAYER JOYSTICK (L,R,D,U)
FE8000-FE8FFE	2KW	1--- --10 10-- AAAA AAAA AAA0	R/W	DDDD DDDD DDDD DDDD	COLORAM 1
FEC000-FECFFE	2KW	1--- --10 11-- AAAA AAAA AAA0	R/W	DDDD DDDD DDDD DDDD	COLORAM 2
FF0000-FF1FFF	KW	1--- --11 000A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	PLAYFIELD 1 PARAMETER RAM
FF2000-FF2FFF	2KW	1--- --11 0010 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	ALPHANUMERICS 1 PARAMETER RAM
FF3000-FF3FFF	2KW	1--- --11 0011 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	MOTION OBJECTS 1 PARAMETER RAM
FF4000-FF5FFF	KW	1--- --11 010A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	PLAYFIELD 2 PARAMETER RAM
FF6000-FF6FFF	2KW	1--- --11 0110 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	ALPHANUMERICS 2 PARAMETER RAM
FF7000-FF7FFF	2KW	1--- --11 0111 AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	MOTION OBJECTS 2 PARAMETER RAM
FF8000-FF9FFF	KW	1--- --11 100A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	COMMUNICATIONS RAM
FFA000-FFBFFF	4KW	1--- --11 101A AAAA AAAA AAAA	R/W	DDDD DDDD DDDD DDDD	P2 PROTECTED PROGRAM RAM
FFC000-FFFFFF	KW	1--- --11 11AA AAAA AAAA AAAA	R	DDDD DDDD DDDD DDDD	P1 PROTECTED PROGRAM RAM

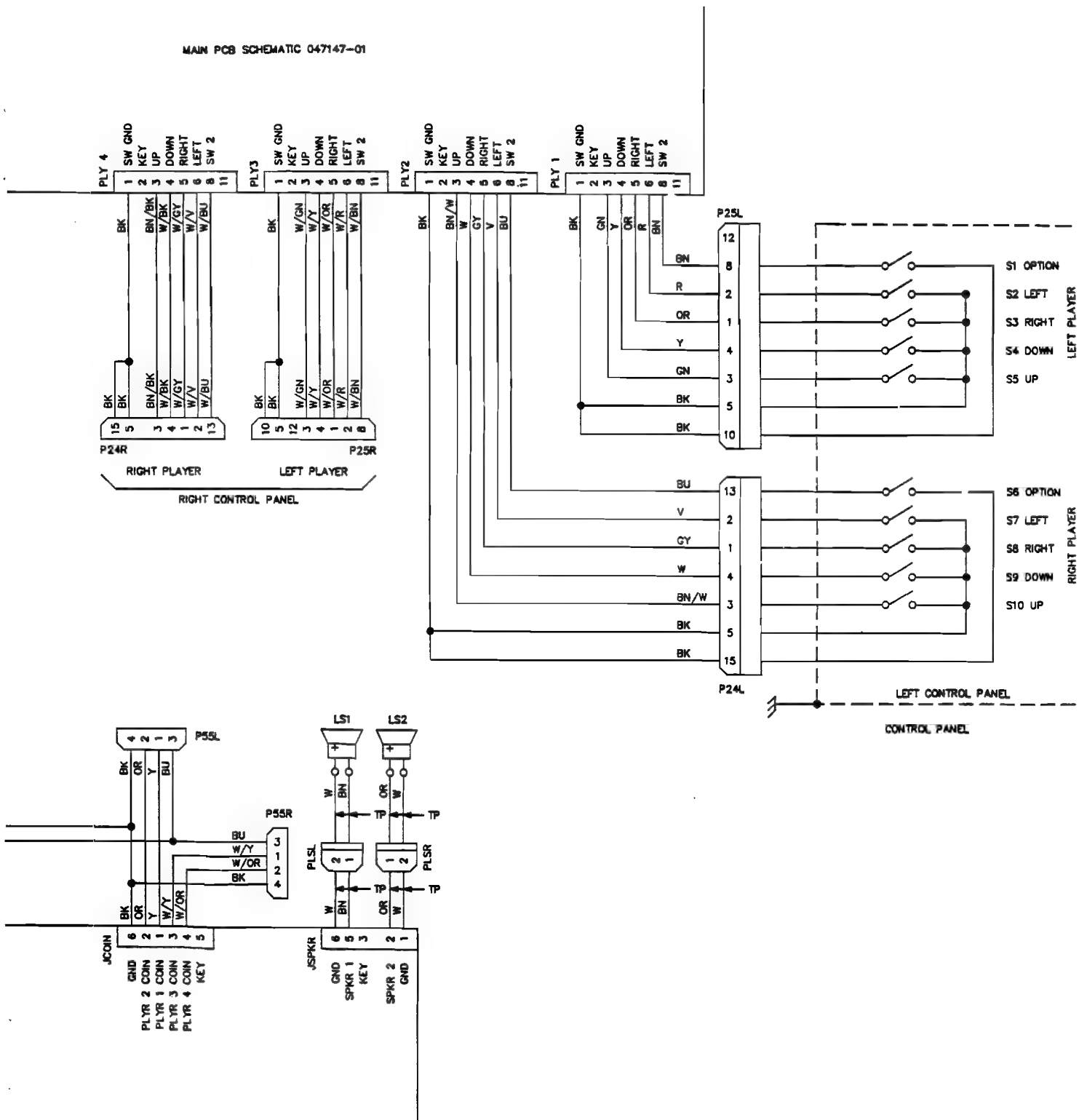**Figure 5-15 Tournament Cyberball 2072 Memory Map**
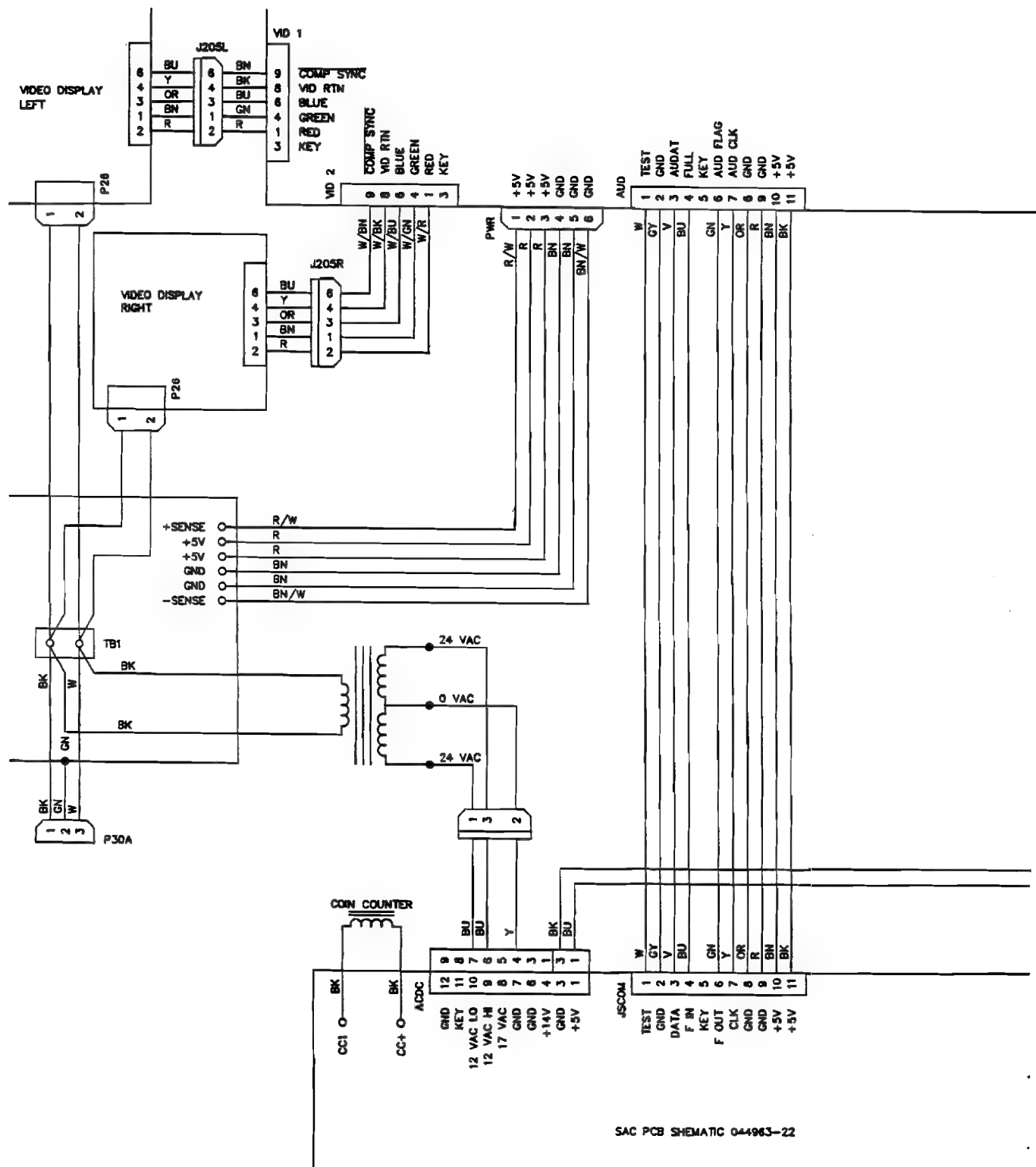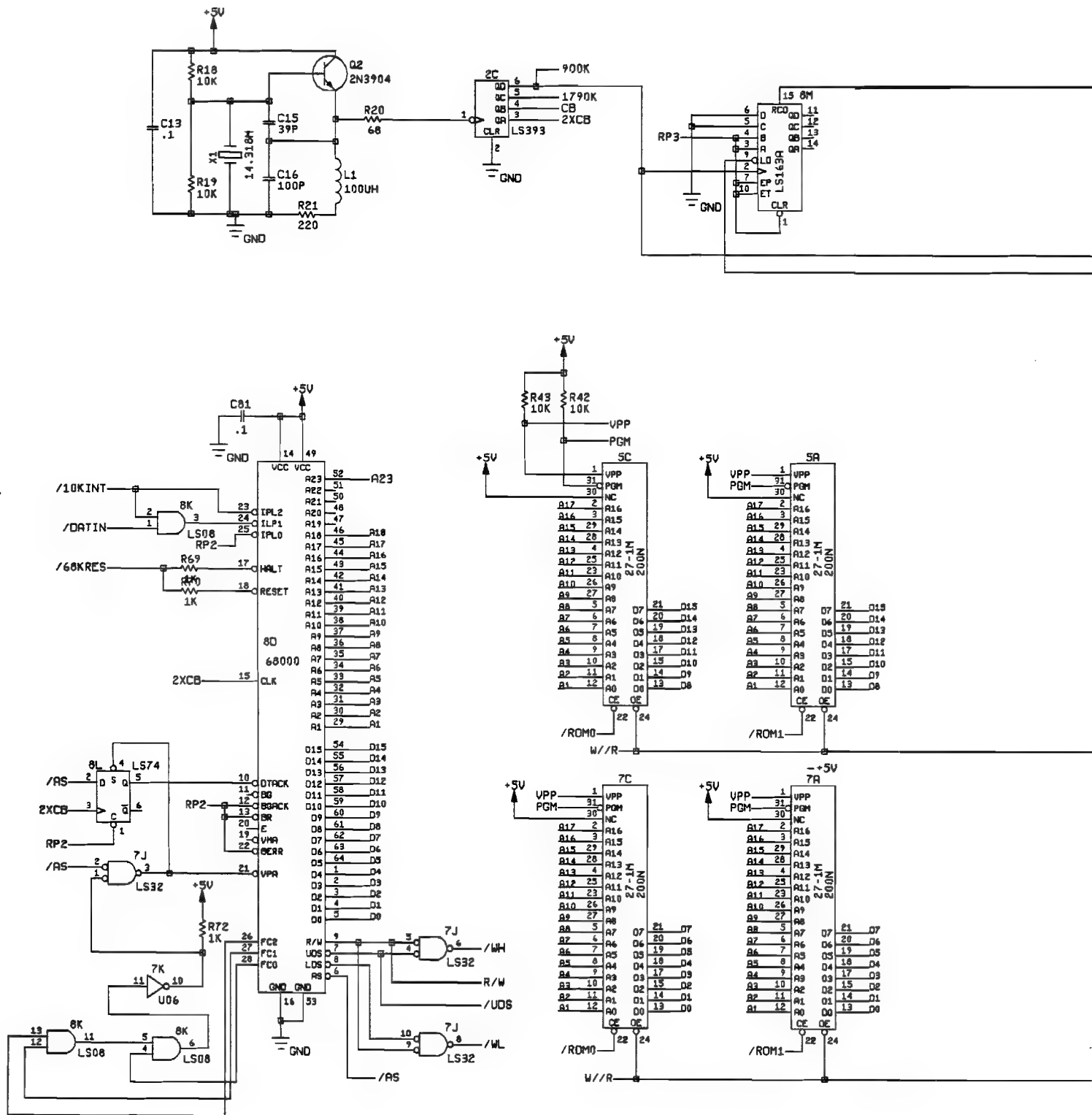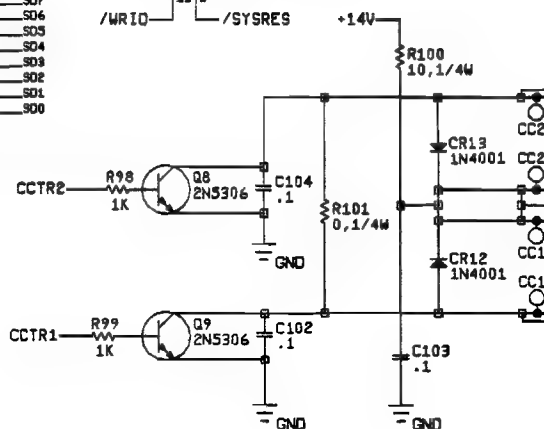
SAC PCB SHEMATIC 044963-22

Figure 5-16 Tournament Cyberball 2072 Main Wiring Diagram

047426-01 A

**Figure 5-17 SAC PCB Assembly Schematic Diagram,
Sheet 1 of 3**

A044963-XX E

**Figure 5-18 SAC PCB Assembly Schematic Diagram,
Sheet 2 of 3**
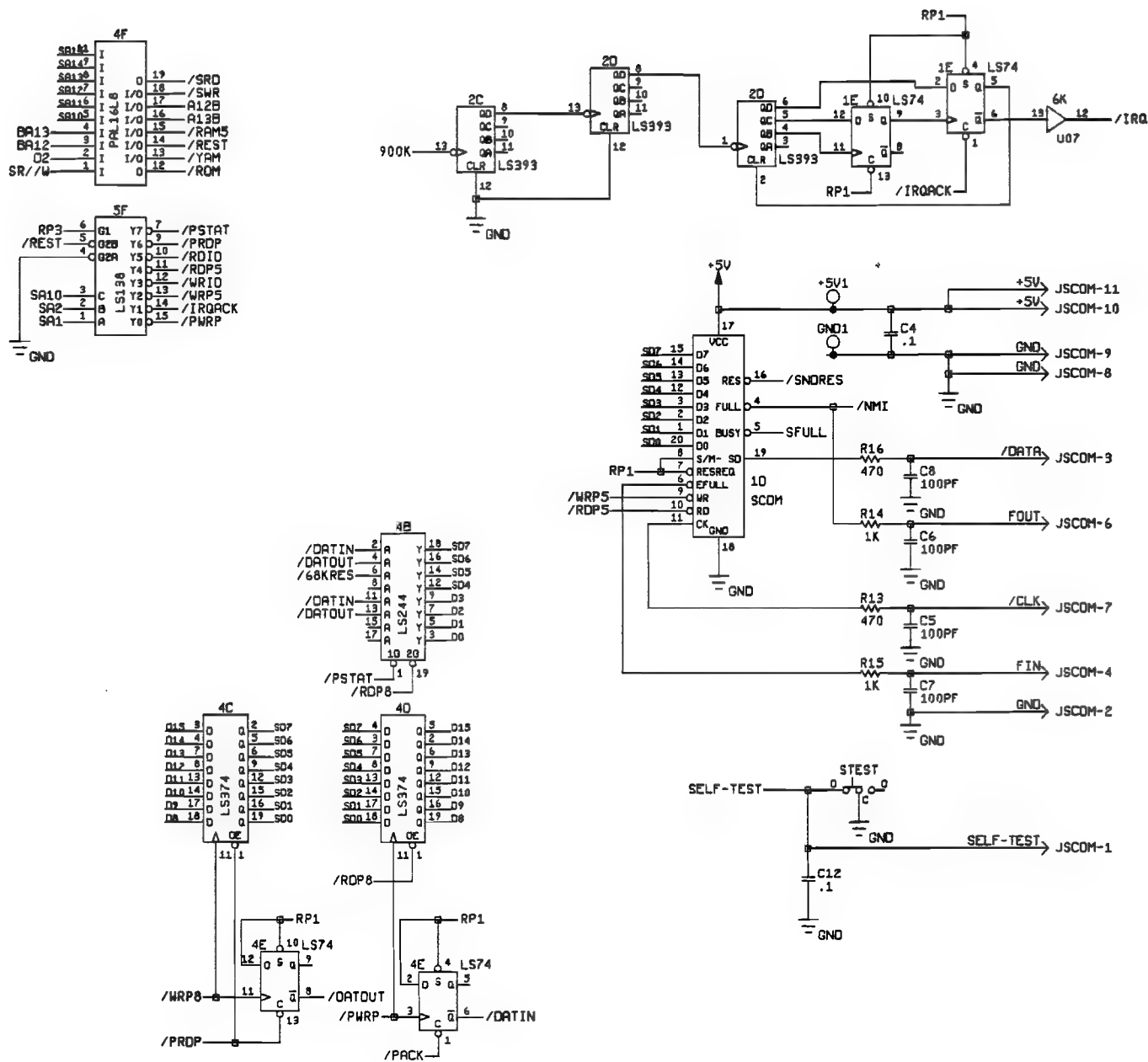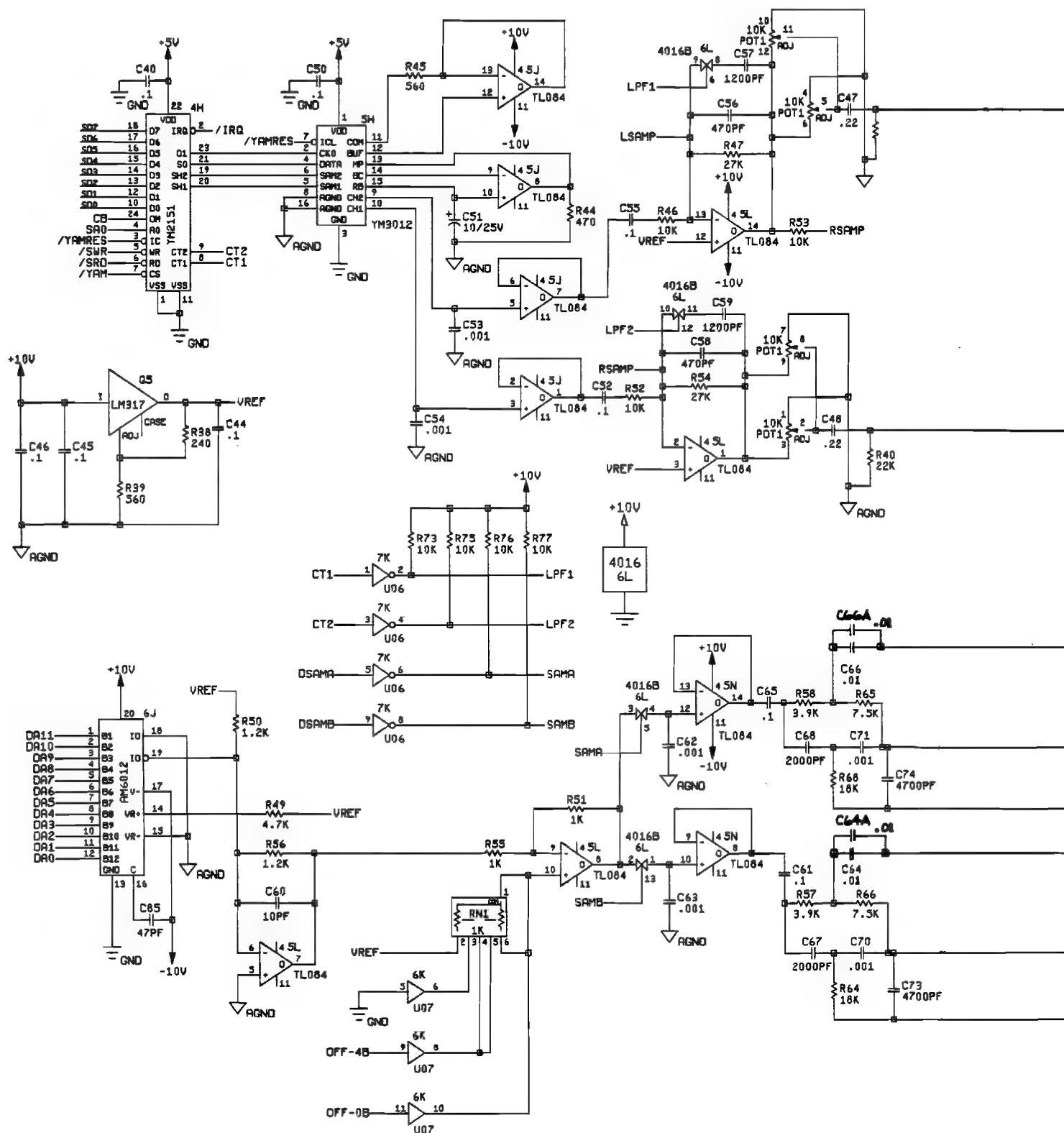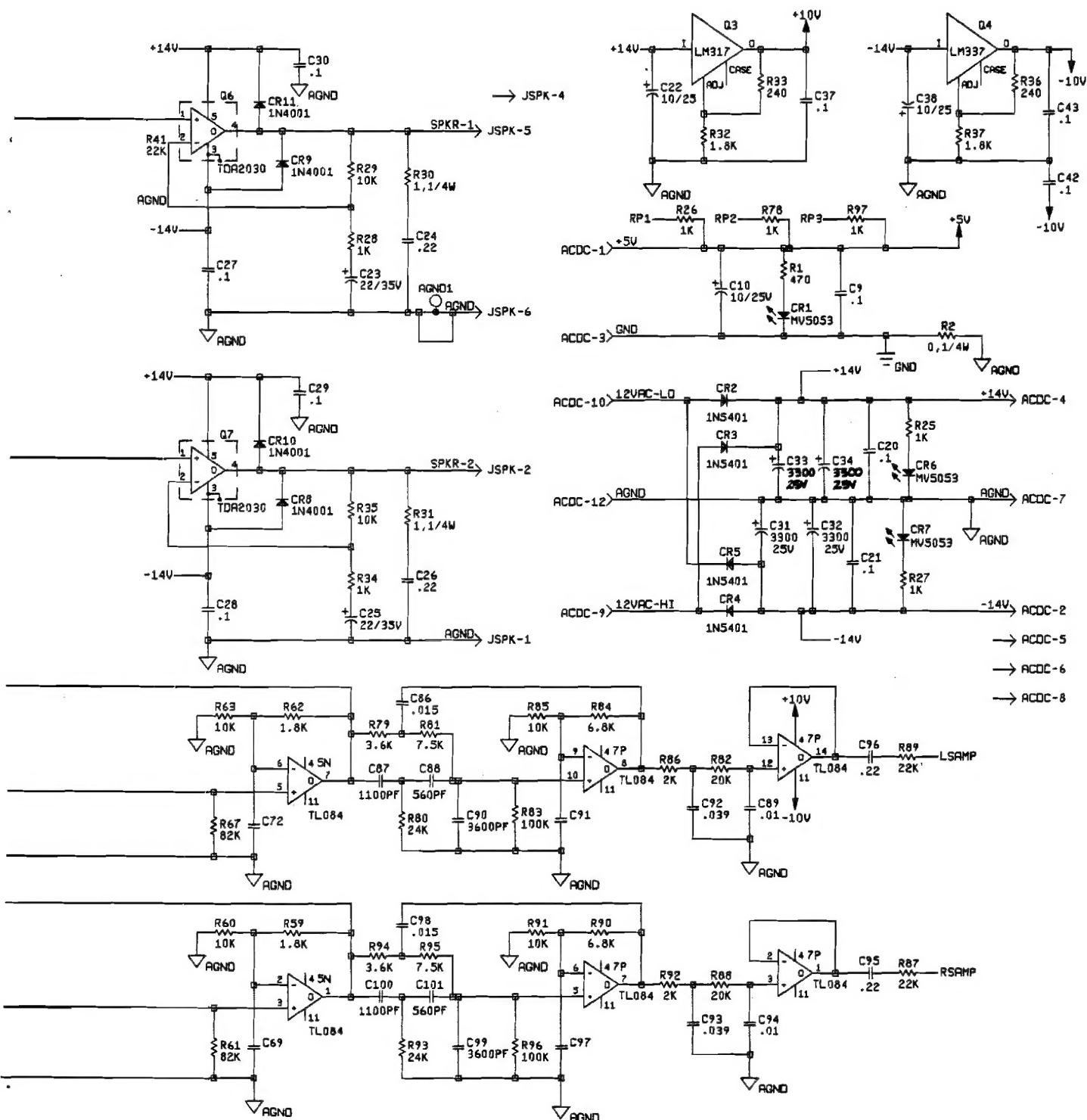
A044963-XX E

**Figure 5-19   SAC PCB Assembly Schematic Diagram,
Sheet 3 of 3**

A044963-XX E

Tournament Cyberball™ 2072 Statistics Sheet

Statistics Screens

First Statistics Screen

Left Screen, Left Mech Coins _____
Left Screen, Right Mech Coins _____
Right Screen, Left Mech Coins _____
Right Screen, Right Mech Coins _____

Total Games _____
0 Player Minutes _____
1 Player Minutes _____
2 Player Minutes _____
3 Player Minutes _____
4 Player Minutes _____
Error Count _____

Total Credits _____
Average Time per Credit _____

Second Statistics Screen

		Percent
Computer Coach Games	_____	_____
Human–Human Games	_____	_____
Game Breakers	_____	_____
1 Period Games	_____	_____
2 Period Games	_____	_____
3 Period Games	_____	_____
4 Period Games	_____	_____
5 Period Games	_____	_____
6 Period Games	_____	_____
7 Plus Period Games	_____	_____

Histogram Screen

Seconds	Number of Credits	Seconds	Number of Credits
0–39	_____	220–239	_____
40–50	_____	240–259	_____
60–79	_____		
80–99	_____	260–279	_____
		280–299	_____
100–119	_____	300–319	_____
120–139	_____	320–339	_____
140–159	_____		
160–179	_____	340–359	_____
		360–379	_____
180–199	_____	380–399	_____
200–219	_____	400 & Up	_____

Warranty

Seller warrants that its printed-circuit boards and parts thereon are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. Seller warrants that its video displays and laser-video disc players (in games supplied with displays and video-disc players) are free from defects in material and workmanship under normal use and service for a period of thirty (30) days from date of shipment. None of the Seller's other products or parts thereof are warranted.

If the products described in this manual fail to conform to this warranty, Seller's sole liability shall be, at its option, to repair, replace, or credit Buyer's account for such products which are returned to Seller during said warranty period, provided:

  (a) Seller is promptly notified in writing upon discovery by Buyer that said products are defective;

  (b) Such products are returned prepaid to Seller's plant; and

  (c) Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

In no event shall Seller be liable for loss of profits, loss of use, incidental or consequential damages.

Except for any express warranty set forth in a written contract between Seller and Buyer which contract supersedes the terms herein, this warranty is expressed in lieu of all other warranties expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on the Seller's part, and it neither assumes nor authorizes any other person to assume for the Seller any other liabilities in connection with the sale of products by Seller.

The use of any non-Atari parts may void your warranty, according to the terms of the warranty. The use of any non-Atari parts may also adversely affect the safety of your game and cause injury to you and others. Be very cautious in using non-Atari-supplied components with our games, in order to ensure your safety.

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